SONY

DIGITAL BETACAM CAMCORDER

DVW-700/700P
DVW-700WS/700WSP

Digital BETACAM™

Digital 1000

MAINTENANCE MANUAL Part 1

1st Edition (Revised 1)

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To reduce the risk of electric shock, fire or injury, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.

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Die Anleitung ist nur für qualifiziertes Fachpersonal bestimmt.
Alle Wartungsarbeiten dürfen nur von qualifiziertem Fachpersonal ausgeführt werden. Um die Gefahr eines elektrischen Schlages, Feuergefahr und Verletzungen zu vermeiden, sind bei Wartungsarbeiten strikt die Angaben in der Anleitung zu befolgen. Andere als die angegeben Wartungsarbeiten dürfen nur von Personen ausgeführt werden, die eine spezielle Befähigung dazu besitzen.

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DVW-700	Serial No. 10001 and Higher
DVW-700WS	Serial No. 10001 and Higher
DVW-700P	Serial No. 40001 and Higher
DVW-700WSP	Serial No. 40001 and Higher

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This manual used to be printed on paper but is now in electronic form. All blank pages in the printed version have been eliminated in the electronic version to facilitate printing at service stations. Hence, although some pages may appear to be missing, no service information has been omitted.

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MANUAL STRUCTURE

Purpose this manual

This manual is the maintenance manual of Digital Betacam Camcorder DVW-700/700P and DVW-700WS/700WSP.
This manual describes the maintenance information of this unit, and the information on primary services such as the replacement of main blocks and circuit boards.

Contents

The following is a summary of the sections for understanding the contents of this manual.

Section 1 SERVICE OVERVIEW
Explains the locations of main part, the functions of printed circuit board, the removal and installation of cabinet, and the measures against trouble.

Section 2 ERROR CODE AND ERROR MESSAGE
Explains the error codes and error messages.

Section 3 MAINTENANCE MODE
Explains the maintenance mode of this unit.

Section 4 BLOCK DIAGRAMS AND CIRCUIT DESCRIPTIONS
Describes the overall block diagrams, the block diagrams for every circuit block, and the circuit descriptions.

Section 5 ELECTRICAL ALIGNMENT
Explains the general information for electrical adjustments and the electrical adjustments of camera and VTR systems.

Section 6 PERIODIC MAINTENANCE AND INSPECTION
Explains the cleaning procedures and periodic checks.

Section 7 REPLACEMENT OF PERIODIC MAINTENANCE PARTS
Explains how to replace the parts that should replace periodically and how to adjust them after the replacement.

Section 8 REPLACEMENT OF CIRCUIT BOARDS
Explains how to replace the plug-in boards, the flexible card wires, and the another circuit boards.

Section 9 SPARE PARTS
Describes the exploded views for the unit, mounted,printed circuit boards list.

APPENDIX A
Explains the specification

Related Manual

Besides this "Maintenance Manual Part 1", the following manuals are available for this unit.

- **Operation Manual (Supplied with this unit.)**
  This manual is necessary for application and operation of this unit.

- **Maintenance manual Part 2 (Not supplied with this unit.)**
  This manual describes the information items (adjustments, board layouts,schematic diagrams, detailed parts list, etc.) that premise the service based on parts.
  If this manual is required, please contact to Sony's service organization.

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SECTION 1
SERVICE OVERVIEW

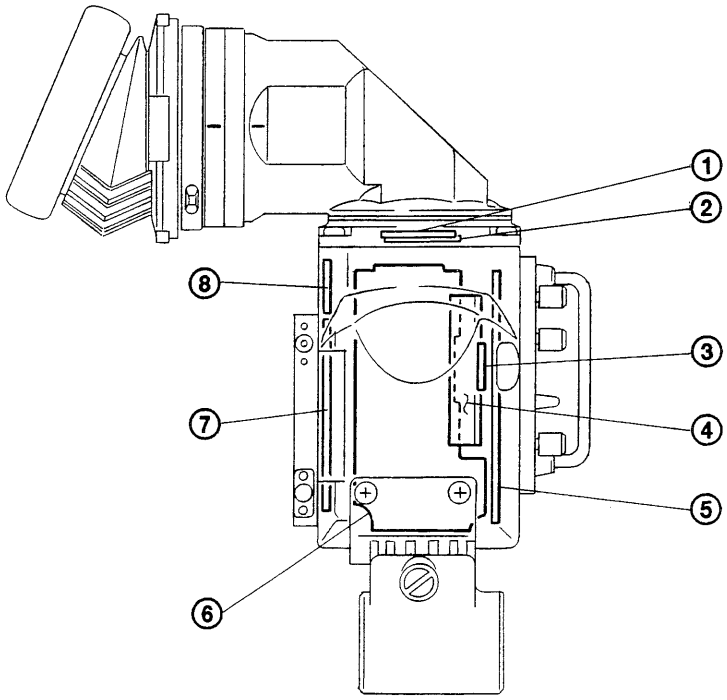
1-1. OPERATING CONDITIONS

Operating temperature : 0 ℃ to 40 ℃
Humidity : 25 % to 85 %
Storage temperature : −20 ℃ to 60 ℃
Use under special environment (Measure for cold area) : The unit is guaranteed its operation under the temperature of 0 ℃ to 40 ℃.When the unit is used under 0 ℃, cover-cloth against the cold is recommended to use.

1-2. LOCATIONS OF MAIN PART AND FUNCTIONS OF PRINTED CIRCUIT BOARD

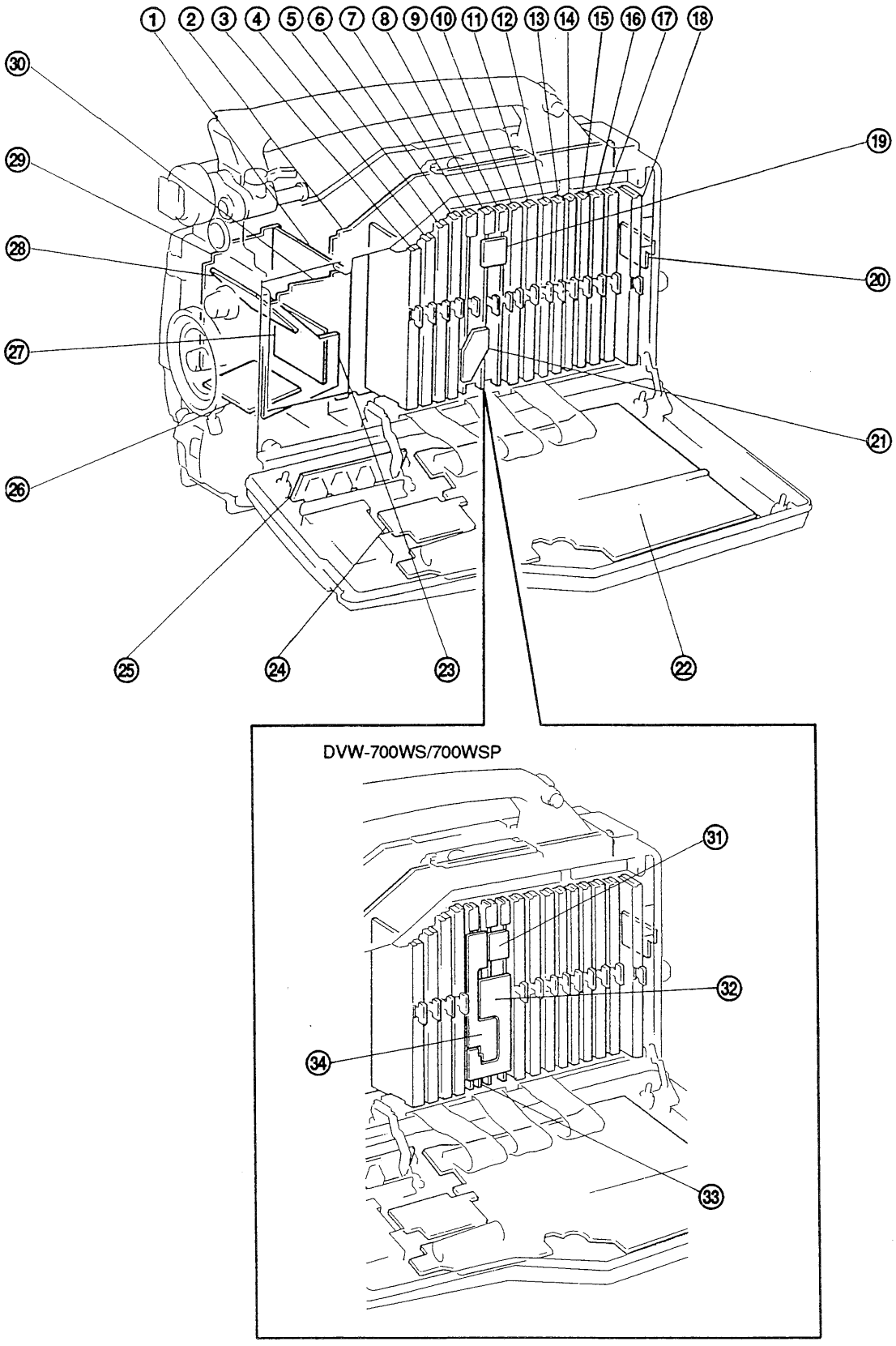
1-2-1. Functions of Printed Circuit Board and Printed Circuit Board Location

VIEWFINDER



Board Name	Circuit Function	No.
CN-951	CONNECTOR (VF CABLE)	7
LP-74	VF REAR TALLY LED	8
LP-75	BATT/REC/G TALLY LED	1
LP-76	⚠ (STATUS WARNING) /REC/VTR SAVE LED	2
LP-77	FRONT TALLY LED	3
SW-652	AUDIO ON/OFF, ZEBRA ON/OFF, TALLY HI/LOW/OFF SWITCH	4
VF-56	DRIVE AND VIDEO AMP FOR VIEWFINDER	6
VR-177A	CONTRAST, BRIGHT, PEAKING VR	5

NOTE
VF : abbreviation of viewfinder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DVW-700WS/700WSP
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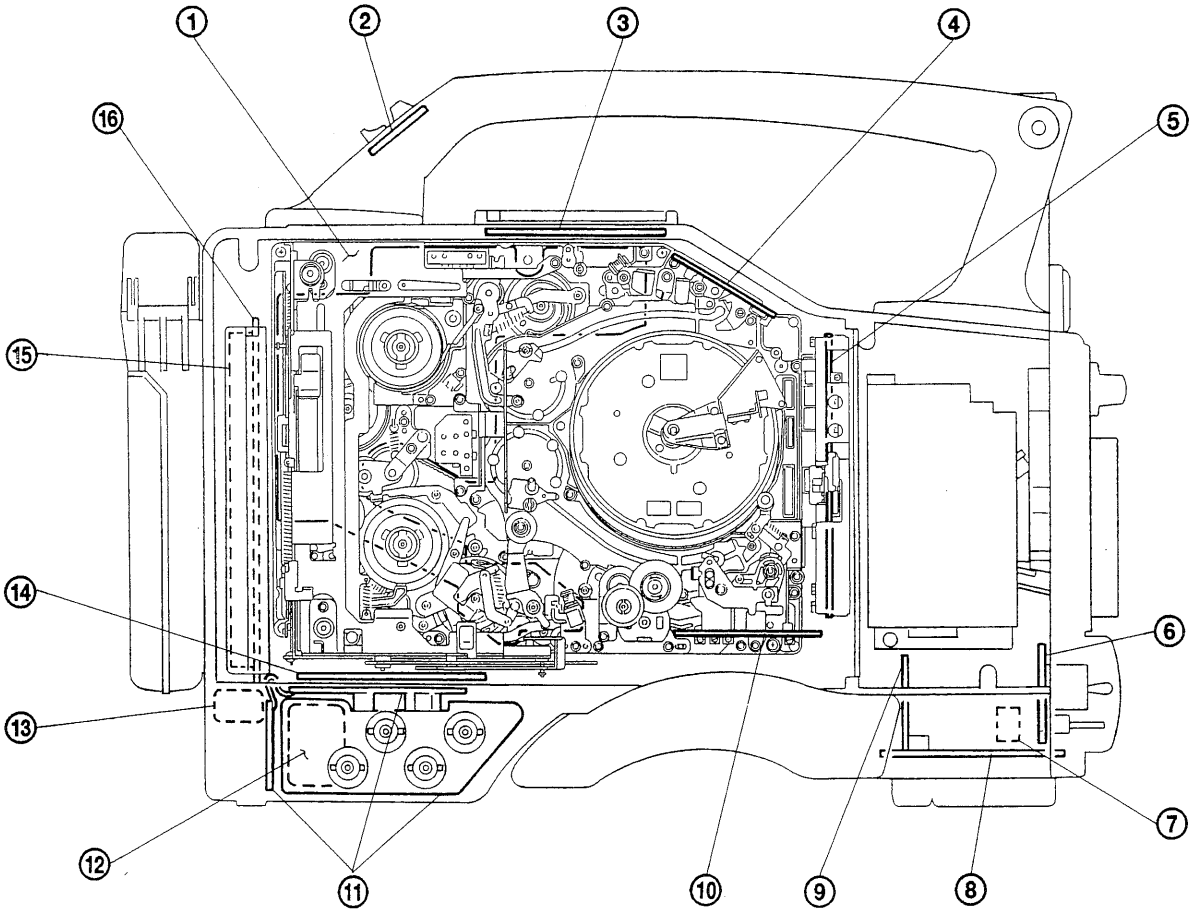
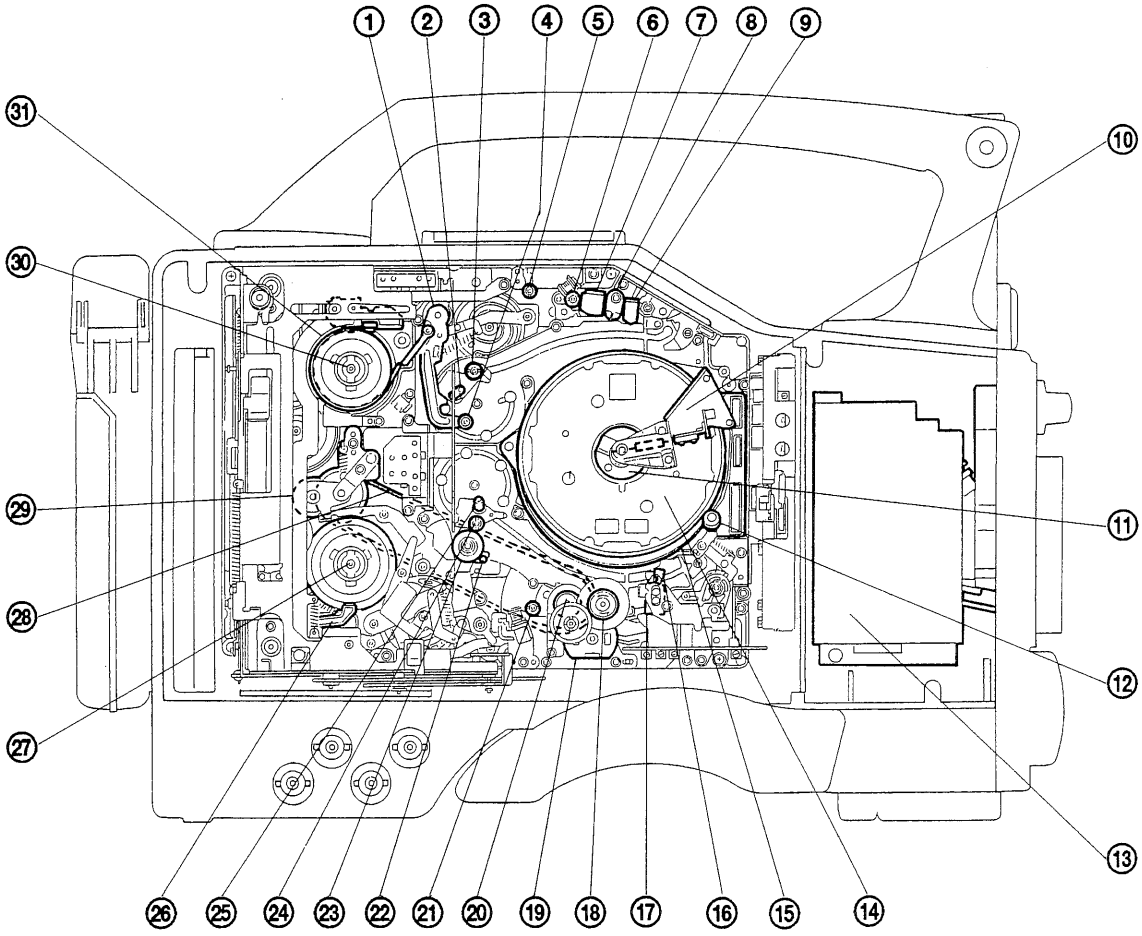
System Configuration	Board Name	Circuit Function	No.
CCD UNIT	CN-775	CONNECTOR PCB FOR BI-64	23
	BI-64 (B)	CCD MOUNT	28
	BI-64 (G)	CCD MOUNT	27
	BI-64 (R)	CCD MOUNT	26
	DR-195	CCD DRIVER	30
	PA-159	PRE-AMP (SAMPLE & HOLD)	29
	TG-118 *1 TG-118B *2	TIMING GENERATOR	1
CAMERA	AD-97	A/D CONVERTER	6
	AT-84	AUTO WHITE/BLACK FUNCTION, VF CHARACTER GENERATOR, SYSTEM CONTROLLER, AUDIO LEVEL DETECTOR	4
	CN-956	CONNECTOR PCB FOR 40P	20
	CN-1019 *1	RELAY BOARD FOR SH-47 AND PE-29	21
	CN-1020 *1	RELAY BOARD FOR PE-29 AND DA-76A	19
	CN-1103 *2	RELAY BOARD FOR SH-47 AND DP-213	32
	CN-1104 *2	RELAY BOARD FOR DP-213 AND PE-29	34
	CN-1105 *2	RELAY BOARD FOR PE-29 AND DA-76A	31
	DA-76A	D/A CONVERTER, RATE CONVERTER	9
	DP-213 *2	ASPECT CONVERTER	33
	IF-443	VF MARKER GENERATOR, VTR INTERFACE, SYNC SEPARATOR	10
	PE-29	DIGITAL PROCESSOR	8
	SH-47	DIGITAL PROCESSOR (VIDEO SIGNAL DETECTOR, SIGNAL GENERATOR FOR SHADING CORRECTION)	7
	VA-144	VIDEO AMP, BLACK SET, TOTAL GAIN CHANGE, SHADING COMPENSATOR	5
VIDEO	DBD-1	DIGITAL BIT REDUCTION DECORDER	17
	DDE-1	DIGITAL DECORDER	18
	DEN-1	DIGITAL ENCORDER	16
	DRC-3	DIGITAL DATA RATE CONVERTER	14
	EQ-48 (1)	EQUALIZER (A, B, E, F-CH)	12
	EQ-48 (2)	EQUALIZER (C, D, G, H-CH)	13
AUDIO	DAP-1	DIGITAL AUDIO PROCESSOR, TIMING CLOCK GENERATOR	15
SERVO	SV-148	SERVO CONTROLLER	3
SYSTEM CONTROL	SY-191	SYSTEM CONTROLLER FOR VTR BLOCK	11
TIME CODE	TC-75	ANALOG AUDIO PROCESSOR, TIME CODE GENERATOR	22
OTHERS	CP-254	SWITCH PANEL	25
	MB-500	MOTHER BOARD	2
	VR-175	MEMORY CARD, AUDIO SELECT SW, ALARM LEVEL, MONITOR LEVEL	24

*1 : for DVW-700/700P Only
*2 : for DVW-700WS/700WSP Only



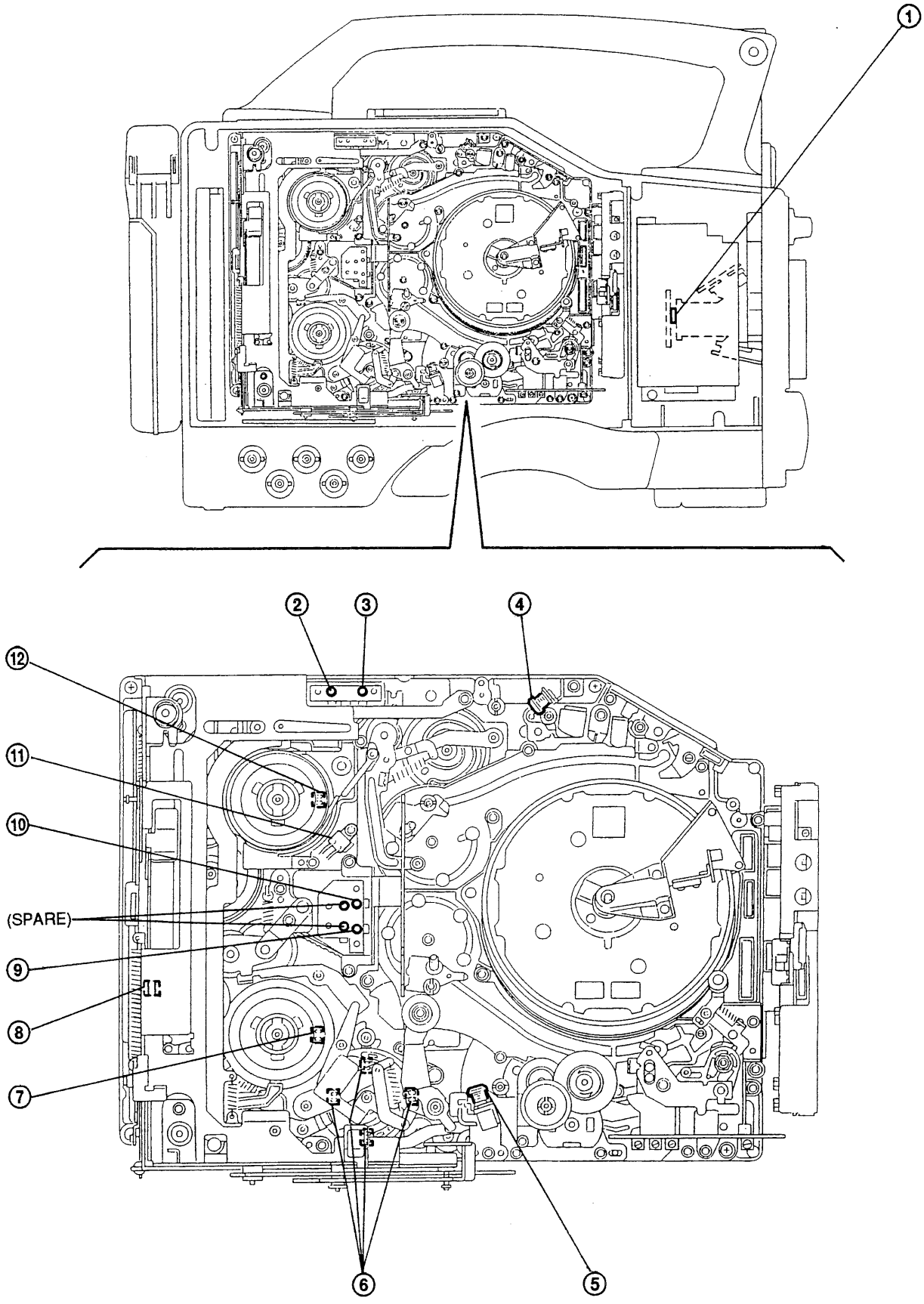
System Configuration	Board Name	Circuit Function	No.
HEAD	CTL-10	CTL/ERASE HEAD AMP	4
	CUE-2	CUE HEAD AMP	10
	HN-189	HARNESS, HEAD AMP	5
MIC	AIF-5	LENS CONTROL, MIC AMP	8
	MA-62	CAMERA MIC	9
	SW-636	MIC LEVEL, AUTO WHITE/BLACK SW, VTR START/STOP SW, SHUTTER ON/OFF SELECT SW	6
CONNECTOR BOX	CN-884	CONNECTOR (TEST OUT, AUDIO IN/OUT)	11
	CO-20	CONNECTOR (VBS OUT)	13
	HP-60	HEADPHONE	12
	PS-333	POWER SUPPLY, CIRCUIT BREAKER	14
POWER SUPPLY	RE-97	REGULATOR	15
	RE-98	REGULATOR, DC-DC CONVERTER	16
OTHERS	KY-293	FUNCTION KEY	3
	PSW-29	POWER SWITCH	7
	SE-275	SENSOR	1
	SW-639	BACK TALLY, BACK TALLY SW	2

1-2-2. Main Mechanical Part Locations



1 : Tension regulator arm
2 : S1 tape guide (on S slider)
3 : S2 tape guide (on S slider)
4 : Tension regulator guide (S4 tape guide)
5 : S5 tape guide
6 : S3 tape guide
7 : Full erase head
8 : Tape cleaner
9 : CTL head
10 : Brush
11 : Slip ring
12 : Video head cleaner
13 : CCD block
14 : Upper drum
15 : Lower drum
16 : CUE head cleaner
17 : CUE/TC head
18 : Manual eject knob
19 : Threading motor
20 : Capstan motor
21 : T3 tape guide
22 : T drawer guide
23 : Pinch roller
24 : T2 tape guide (on T slider)
25 : T1 tape giude (on T slider)
26 : T soft brake
27 : T reel table
28 : Timing belt
29 : Gear
30 : S reel table
31 : Brake band

1-2-3. Sensor Arrangement and Functions



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1 : Temperature Detection Sensor
This sensor detects the temperature and then black correction is performed.

2 : Cassette-in sensor
This sensor detects the existence of a cassette.

3 : REC INHIBIT sensor
This sensor detects the REC inhibiting plug of the cassette tape.

4 : Tape end sensor
This sensor detects the end of the tape that runs in the forward direction.

5 : Tape top sensor
This sensor detects the end of the tape that runs in the reverse direction.

6 : Function cam sensor
This sensor detects the rotation position of a cam.

7 : Take-up reel table rotating sensor
This sensor detects the rotation of the take-up reel table. The FG output signal of this sensor is input to a servo circuit so as to calculate the winding diameter of the tape.

8 : Cassette lock sensor (switch)
This sensor detects that the cassette compartment was locked.

9 : Tape thickness sensor
Using a tub on the back side of the cassette tape, this sensor detects the thickness of the tape wound on a cassette tape that is being inserted into the unit.

10 : Reel hub diameter sensor
The reel hub diameter of a cassette tape varies depending on the length of the tape wound on the cassette tape. The reel hub diameter sensor detects the reel hub diameter by the tab on the back side of the cassette tape. The output signal of this sensor is input to a servo circuit so as to calculate the winding diameter of the tape.

11 : Condensation sensor
This sensor detects whether the dew condensation occurs in the unit.

12 : Supply reel table rotating sensor
This sensor detects the rotation of the supply reel table. The FG output signal of this sensor is input to a servo circuit so as to calculate the winding diameter of the tape.

1-3. MATCHING CONNECTORS

When external cables are connected to the connector on a connector box during maintenance, the hardware listed below (or the equivalents) must be used.

Panel Indication	Connector	Matching Cable Connector/Cable	
		Connector	Sony Part No
GENLOCK IN TC IN TC OUT TEST OUT VIDEO OUT	BNC	BNC	1-560-069-11
AUDIO IN ch1/ch2	XLR 3P, FEMALE	XLR 3P, MALE	1-508-084-00
AUDIO OUT	XLR 3P, MALE	XLR 3P, FEMALE	1-508-083-00
MIC IN +48 V	Mini XLR 3P, FEMALE	Mini XLR 3P, MALE	1-766-379-00
DC IN	XLR, WITH SW, MALE	XLR 4P, FEMALE	1-508-362-00
DC OUT 12 V	ROUND TYPE (RF) 4P	ROUND TYPE 4P, MALE	1-566-425-11
REMOTE	6P, FEMALE	6P, MALE	1-560-078-00

1-4. SIGNAL INPUTS AND OUTPUTS

INPUT

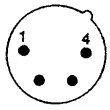
GENLOCK IN	1.0 V p-p, 75 Ω
TC IN	0.5 V to 18 V p-p, 10 kΩ
MIC IN	−60 dBu
AUDIO IN CH-1,CH-2	−60 dBu /+4 dBu (0 dBu = 0.775 Vrms)
DC IN	DC 11 to 17 V

OUTPUT

TEST OUT	1.0 V p-p, 75Ω unbalanced
TC OUT	1.0 V p-p, 75 Ω
VIDEO OUT	1.0 V p-p, 75Ω unbalanced
EARPHONE	8 Ω, −∞ to −18 dBu adjustable
AUDIO OUT	0 dBm (600Ω TERMINATED)
DC OUT	DC 11 to 17 V

DC IN: XLR, 4-pin (male)

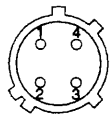
〈External View〉



Pin No.	Signal
1	GND
2	–
3	–
4	BATT OUT (+)

DC OUT 12V: DIN, 4-pin (female)

〈External View〉

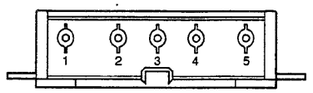


Pin No.	Signal
1	UNREG GND
2	–
3	–
4	UNREG +12 V

1-4. SIGNAL INPUTS AND OUTPUTS

BATT IN: 5-pin (male)

〈External View〉



Pin No.	Signal
1	BATT IN (−)
2	UNREG GND
3	BATT REM
4	LIGHT CONT
5	BATT IN (+)

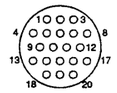
LENS: 12-pin (female)

〈External View〉

Pin No.	Signal
1	RET (SW)
2	VTR TRIG
3	LENS GND
4	AUTO +5 V IN
5	IRIS CONT
6	UNREG +12 V
7	IRIS PSTN
8	REMOTE/LOCAL
9	EXTENDER
10	ZOOM PSTN
11	FOCUS PSTN
12	PROJ ON

VF: 20-pin (female)

〈External View〉



Pin No.	Signal
1	VTR SAVE LED
2	NON STD LED
3	V-SIZE
4	TALLY (DOWN)
5	–
6	NTSC/PAL
7	AUDIO DISP ON
8	G TALLY
9	–
10	–
11	ZEBRA ON
12	VF VIDEO (X)
13	(FRONT MIC CONT)
14	–
15	–
16	H: BATT ALARM
17	TALLY (UP)
18	+9.3 V
19	VF GND
20	UNREG +12 V

REMOTE: 6-pin (female)

〈External View〉

Pin No.	Signal
1	SD (RM)
2	SD (RM) I/O
3	UNREG GND
4	RM TEST (G)
5	RM TEST (X)
6	UNREG +12 V

1-9

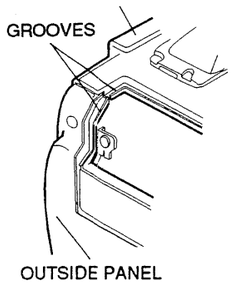
1-5. OUTER CABINET REMOVAL AND INSTALLATION

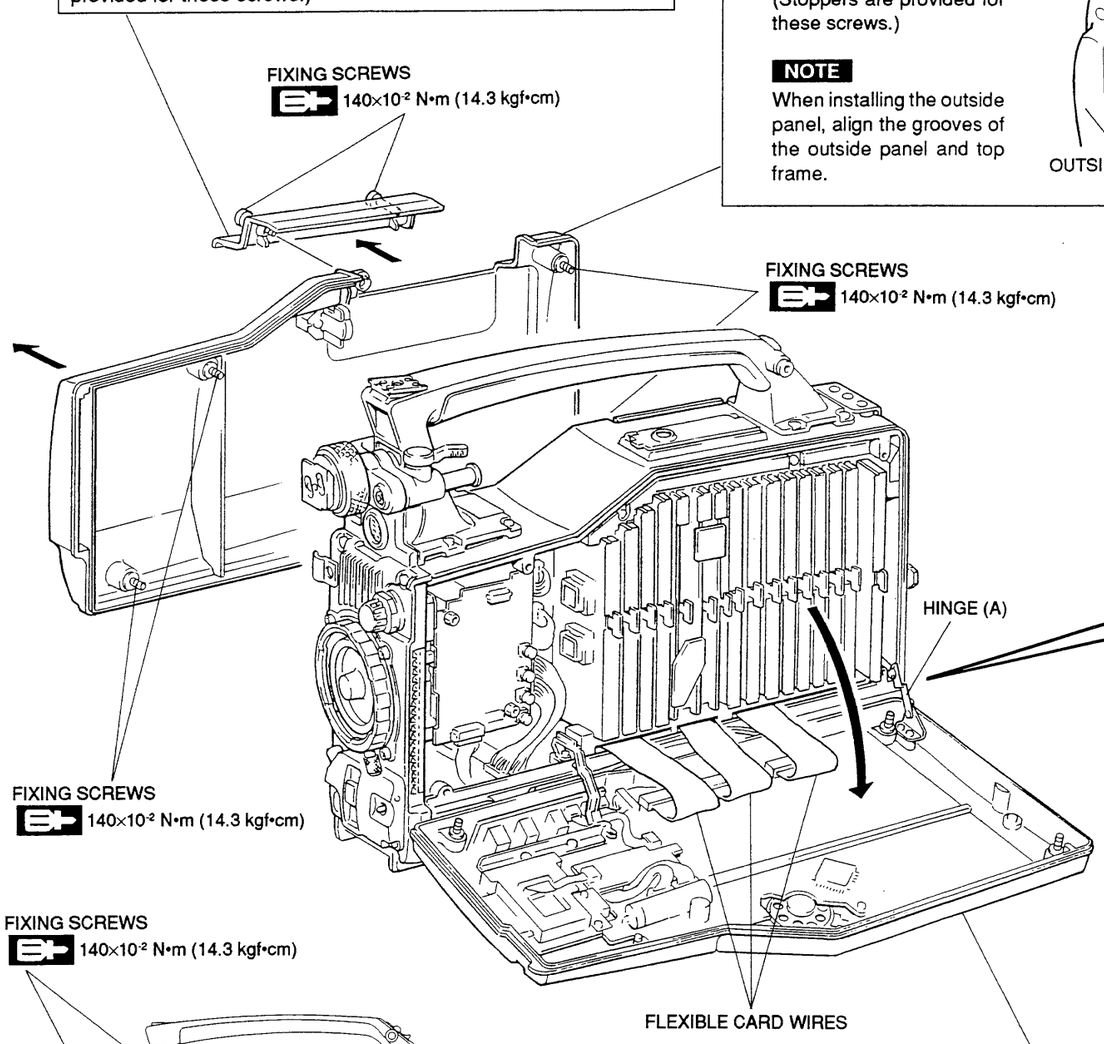
- Screwdriver mark and following numbers are indicating the value of fastening torque.

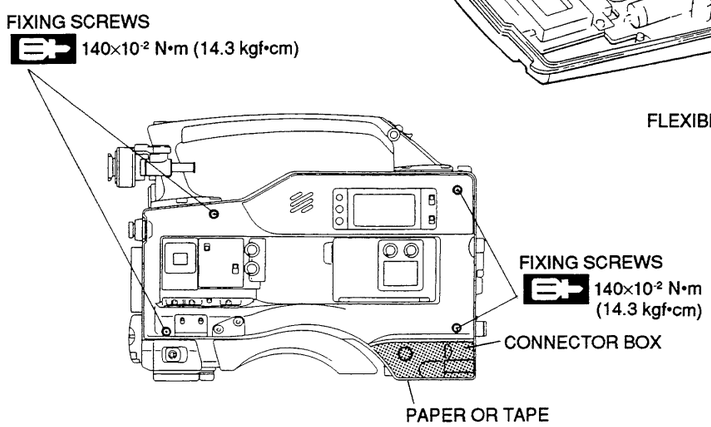
Front Lid
Loosen the two screws fully and remove the front lid. (Stoppers are provided for these screws.)

Outside Panel
1. Remove the front lid.
2. Loosen the four screws fully and remove the outside panel. (Stoppers are provided for these screws.)

NOTE
When installing the outside panel, align the grooves of the outside panel and top frame.







Inside Panel
Loosen the four screws fully and open the inside panel in the direction indicated by the arrow. (Stoppers are provided for these screws.)

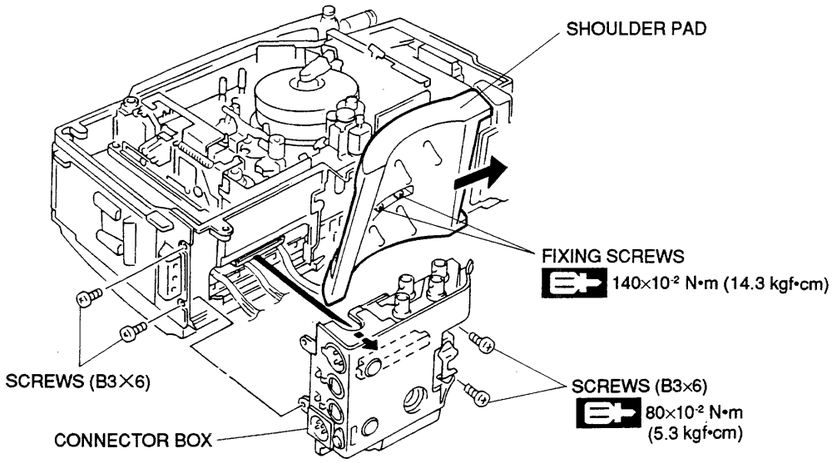
NOTES
- Be careful not to bend the three flexible card wires intentionally.
- When removing, pinch a sheet of paper or the like between the hinge (a) and connector box to stop it getting damaged, because of contacting the hinge (a) with connector box.

Connector Box

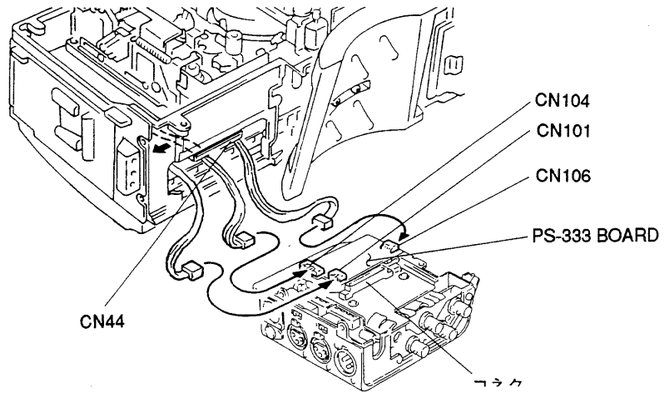
NOTE
Perform the procedure below with the battery pack removed.

Removal

1. Remove the front lid and outside panel.
2. Loosen the two screws and shift the shoulder pad forward.
3. Remove the four screws, then remove the connector box.



4. Disconnect connectors CN101, CN104, and CN106 on the PS-333 board.



Cautions during Installation

1. Insert connector CN104 into the back side of the main unit's bracket in the direction indicated by the arrow.
2. Connect the board-to-board connector CN44 on the MB-500 board securely to the board-to-board connector CN1 on the CN-884 board of the connector box.
3. After attaching the connector box, perform the tape running adjustment and video tracking adjustment. (Refer to sections 7-4-1 and 7-4-2.)

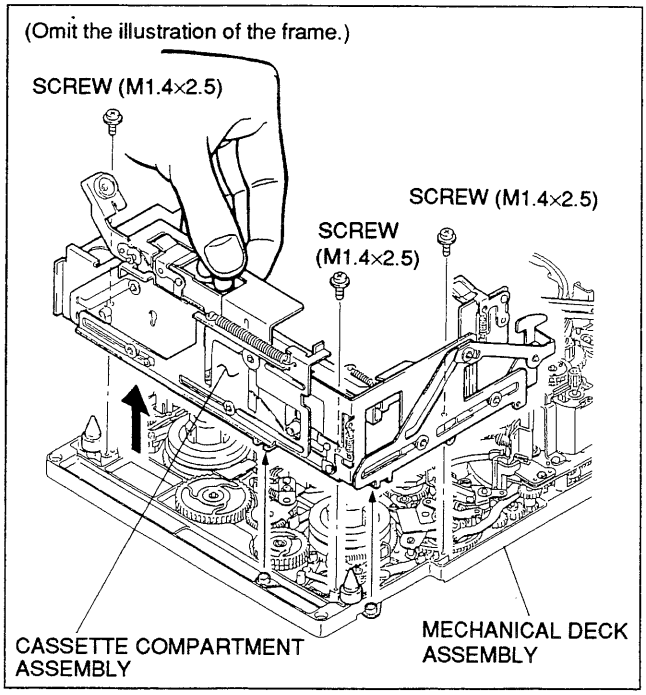
1-6. CASSETTE COMPARTMENT REMOVAL AND INSTALLATION

NOTES

- The cassette compartment can be removed even if it comes up or goes down.
- Turn off the power and perform the procedure below.

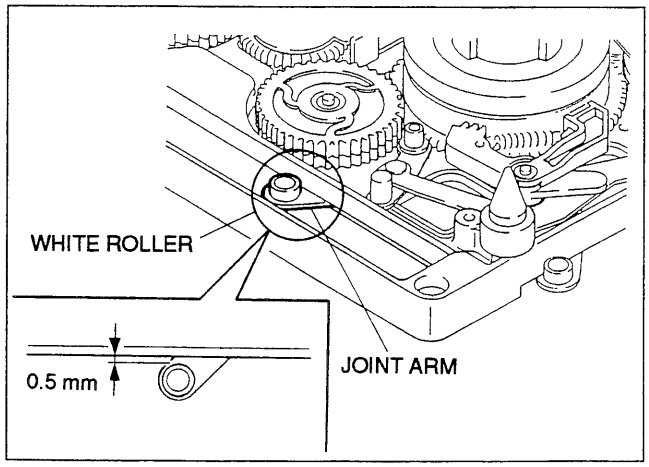
Removal

1. Remove the front lid and outside panel. (Refer to section 1-5.)
2. Remove the three screws, hold the position of the cassette compartment shown in the figure, and remove it in the direction indicated by the arrow.

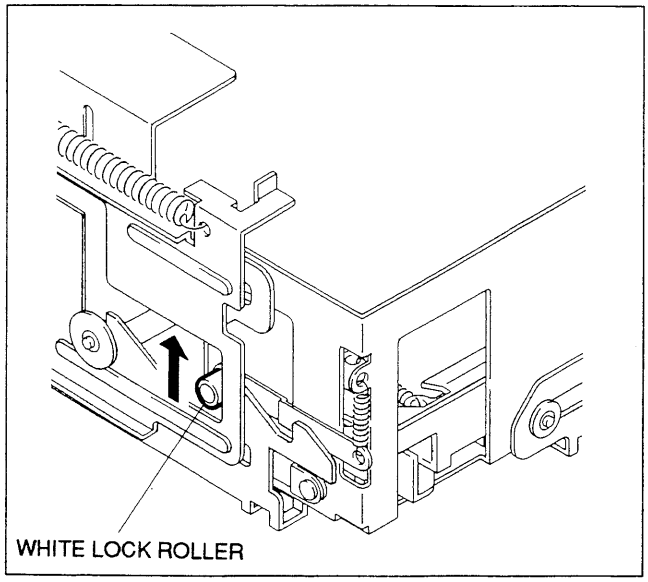


Installation

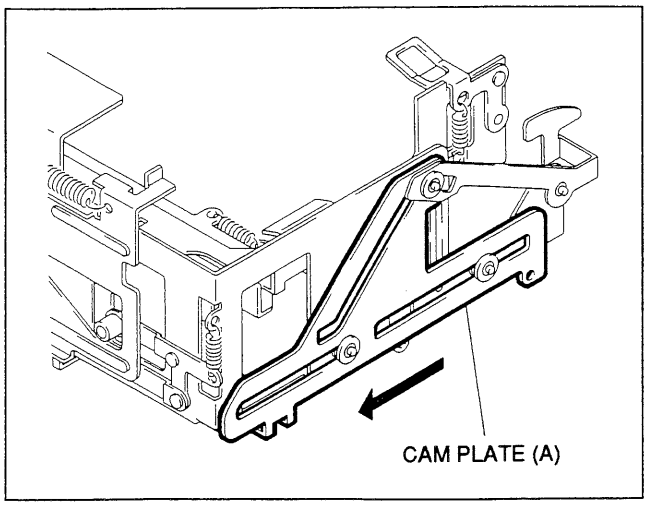
1. Adjust the position of the joint arm so that the clearance between the white roller's outer circumference of a joint arm and the end face of the mechanical deck assembly is 0.5 mm.



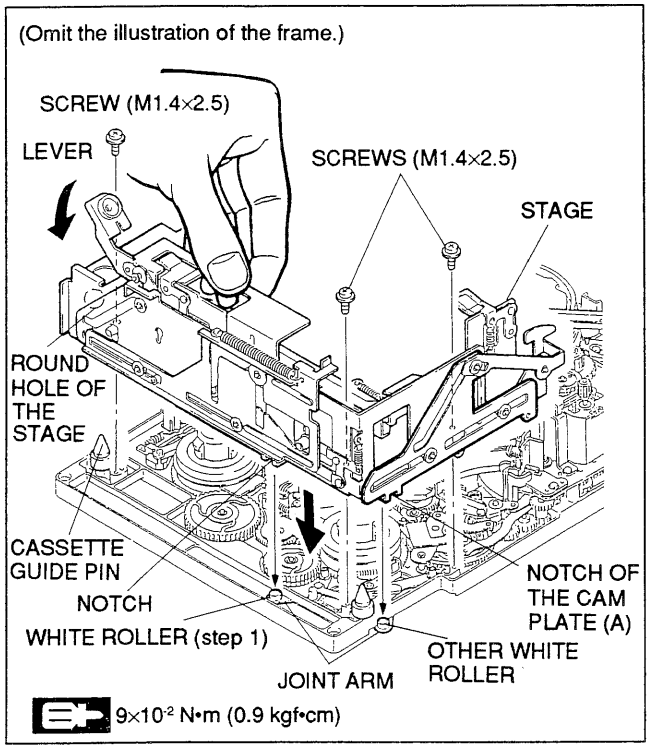
2. Raise the white lock roller of the cassette compartment so that it comes up.



3. Move the cam plate (A) on the right side of the cassette compartment in the direction of the arrow with fingers as far as it will go.



4. Hold the position of the cassette compartment shown in the figure and attach two cassette guide pins in the chassis so that they are put in the round holes of the stage.
   At that time, confirm that the other white roller of the joint arm positioned in step 1 is put in the notch of the cam plate (A) on the right side.
5. Push the lever of the cassette compartment and confirm that the stage smoothly moves up and down. If not, re-confirm steps 1 to 4.
6. Attach the cassette compartment with three screws.

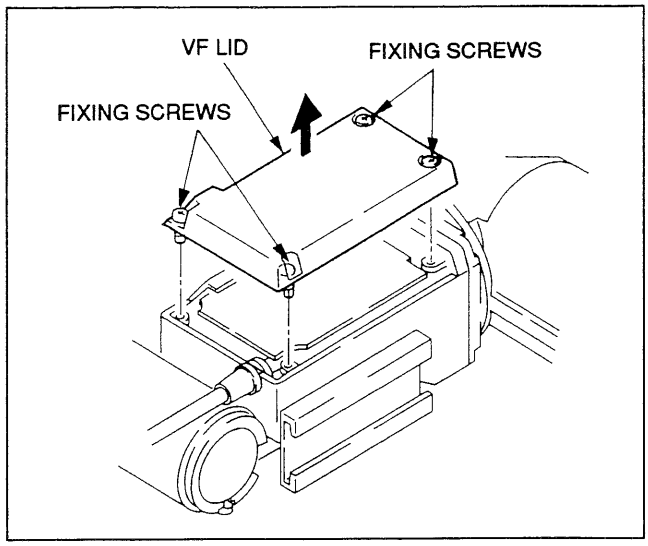


1-7. HARNESS DRAWING

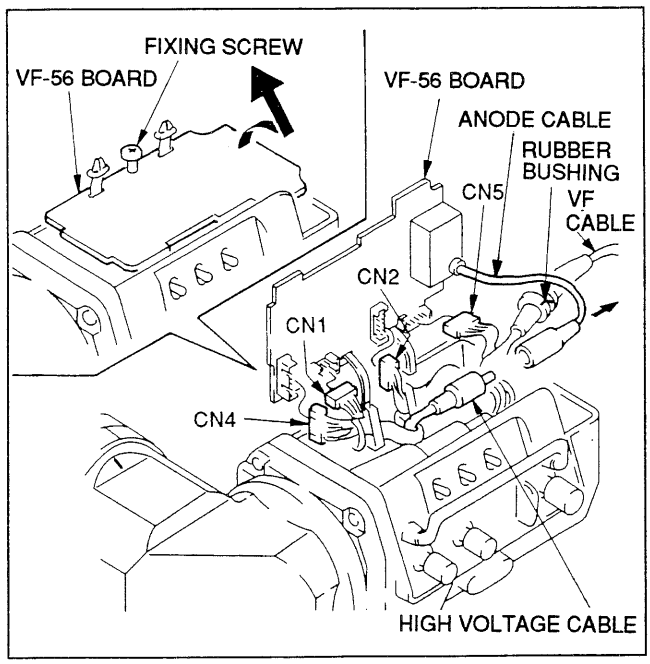
1-7-1. CRT Replacement

Removal

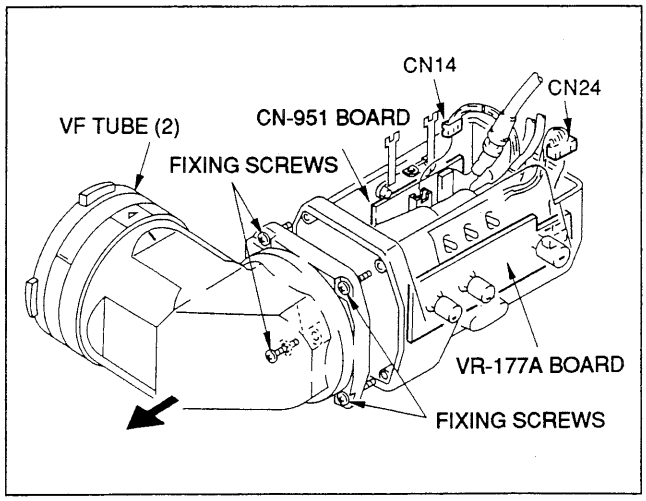
1. Loosen the four screws and remove the VF lid. (Stoppers are provided for these screws.)



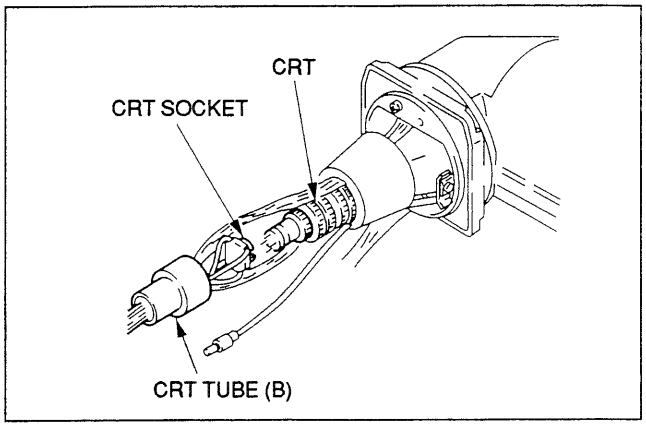
2. Loosen one screw and remove the rubber bushing of the VF cable from the VF main's unit, and then remove the VF-56 board.
   Disconnect the anode cable and connectors (CN1, CN2, CN4, and CN5) from the VF-56 board.



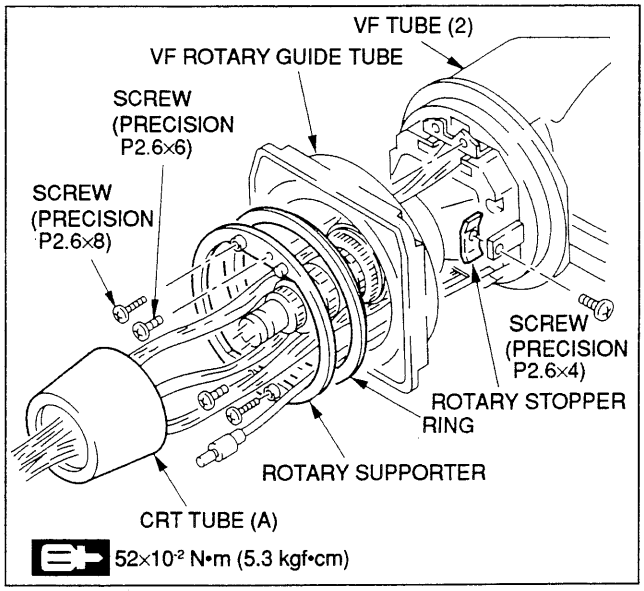
3. Disconnect the connector CN14 on the CN-951 board and the connector CN24 on the VR-177A board.
4. Loosen the four screws and remove the VF tube (2).



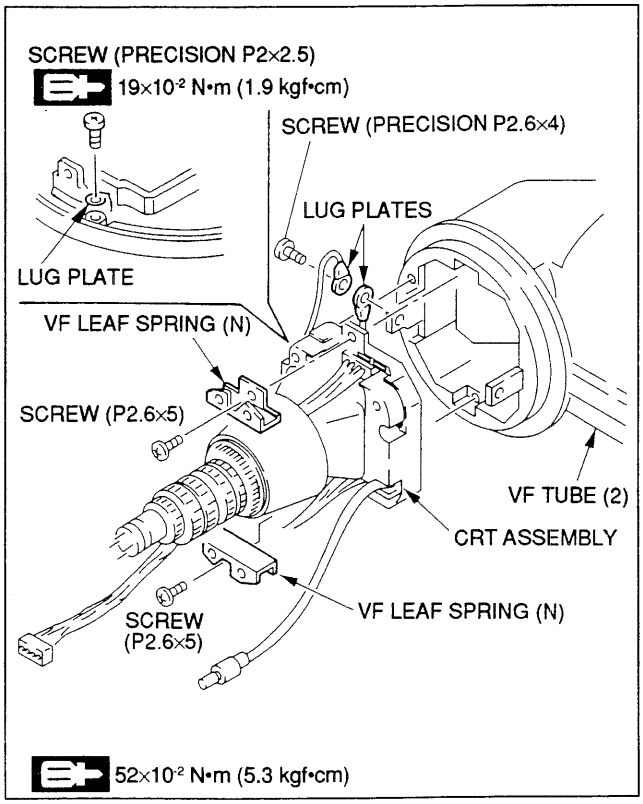
5. Remove the CRT tube (B), then remove the CRT socket from the CRT.



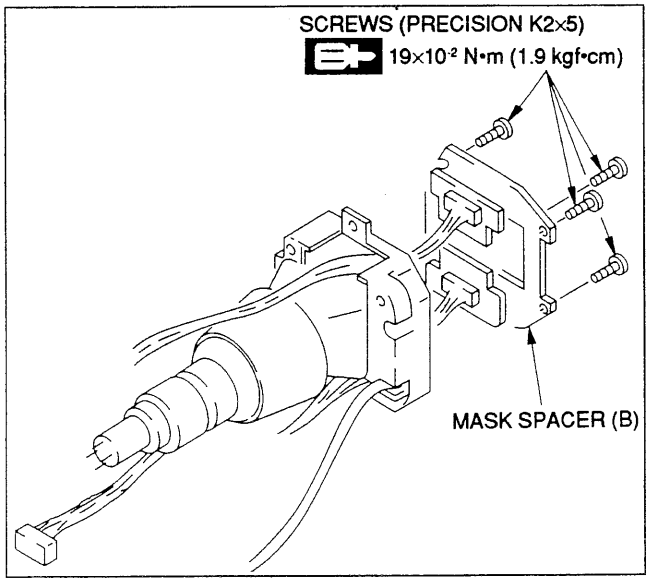
6. Remove the CRT tube (A).
7. Remove one screw, then remove the rotary stopper.
8. Remove the four screws, then remove the rotary supporter, ring, and VF rotary guide tube.



9. Remove one screw, then remove the two plate lugs.
10. Remove one screw, then remove the two VF leaf spring (N).
    Remove one screw, then remove the lug plate.



11. Remove the four screws, then remove the mask spacer (B).



Installation

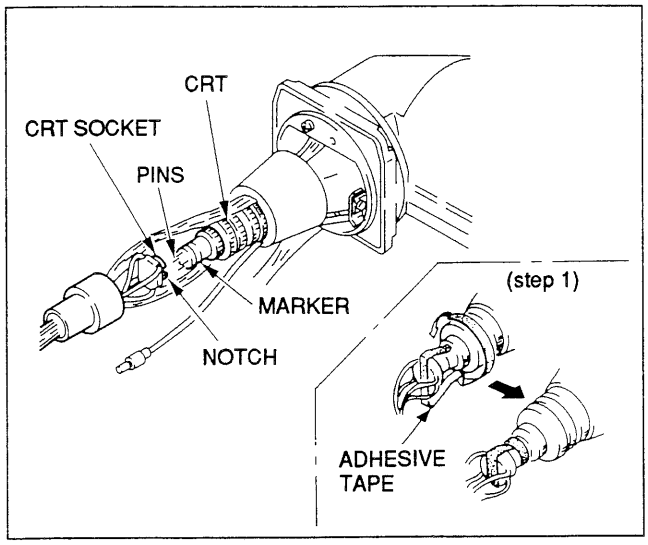
NOTE

Draw the harnesses with care during installation.

1. Assemble in the reverse order of removal steps 6 through 11.
2. Insert the CRT socket to the CRT.

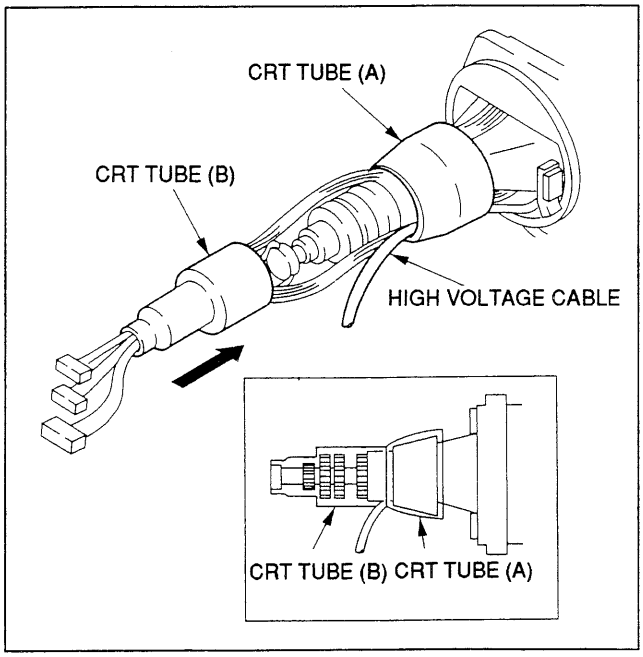
NOTES

- Adjust so that a CRT marker coincides with the notch of the CRT socket when the CRT socket is inserted.
- Be careful not to break the four pins of the CRT.
- After installing the CRT socket, fasten by winding adhesive tape around the neck part and socket part. (Refer to step 1.)
- Tinghtening torqute of the rotary stopper:
  0.15 N•m (1.5 kgf•cm)

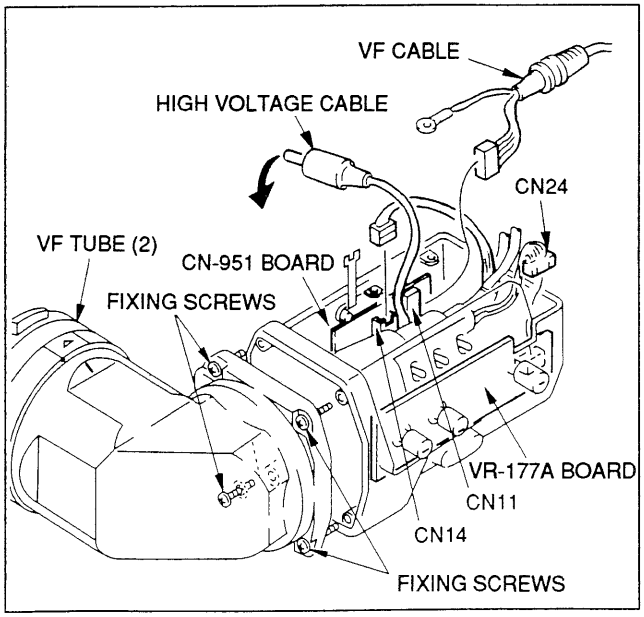


3. Put the CRT tubes (A) and (B) on the CRT.

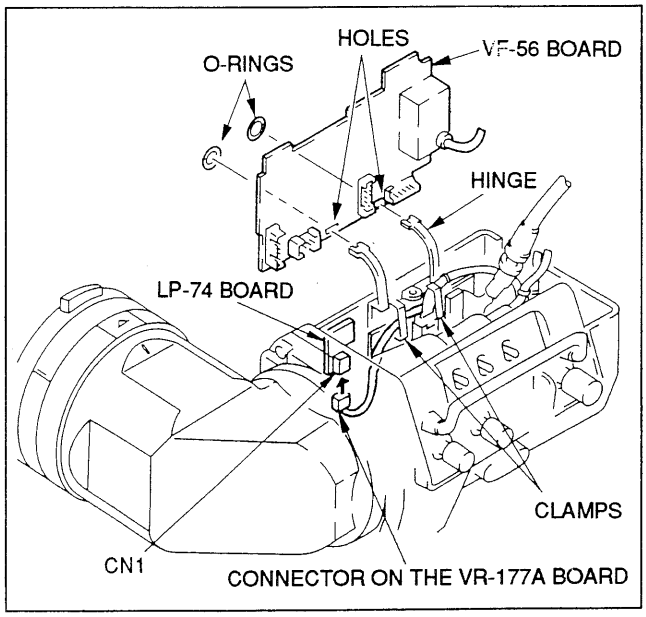
NOTE
Take care that the harnesses do not slacken in the CRT tubes.



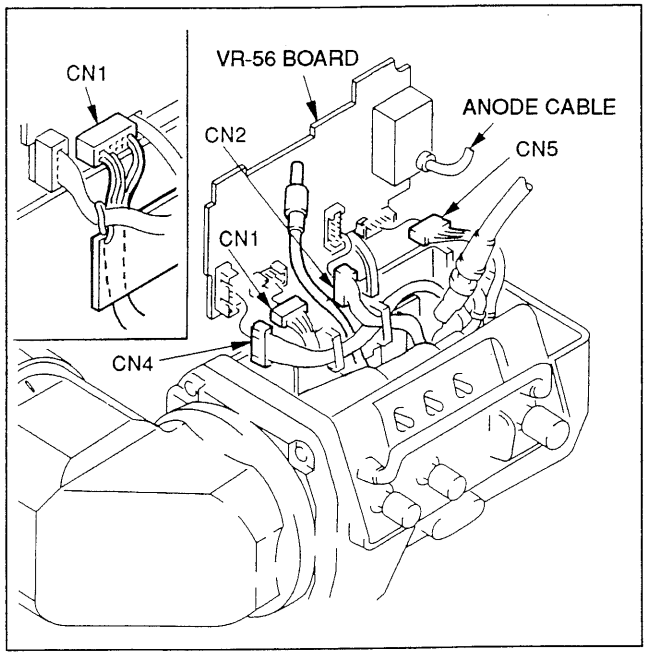
4. Connect the CRT connector to connector CN24 on the VR-177A board and connector CN14 on the CN-951 board and push down the high-voltage cable in the direction indicated by the arrow.
Connect the VF cable connector to connector CN11 on the CN-951 board.
Attach the CRT-incorporated VF tube in the VF's main unit with four screws.
40×10^{-2} N•m (4.0 kgf•cm)



5. Pass the connector on the VR-177A board through the clamp and connect it to connector CN1 on the LP-74 board.
6. Insert the hinge into the hole on the VF-56 board and fix it using an O-ring.

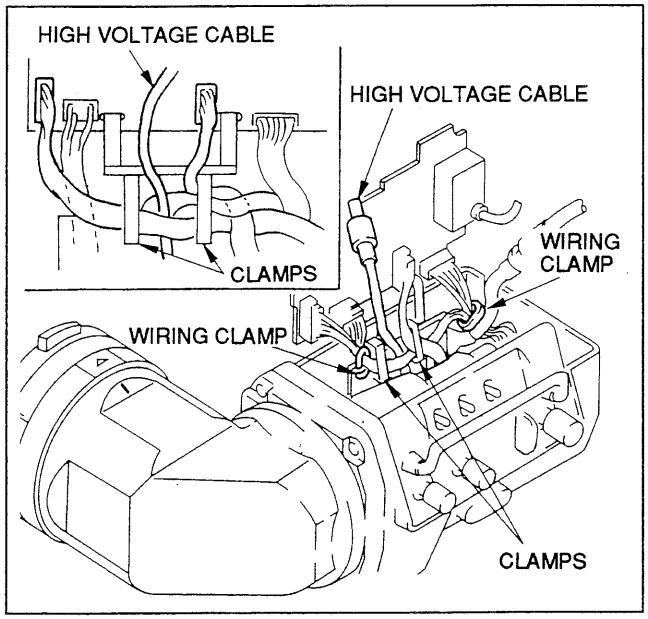


7. Connect the CRT connector to connectors CN1, CN2, CN4, and CN5 on the VF-56 board.

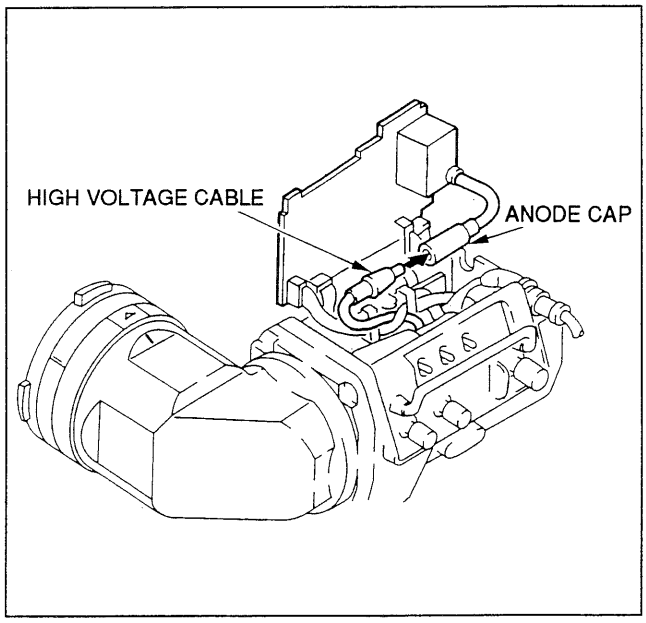


8. Bundle the harnesses using a clamp and wiring clamp.

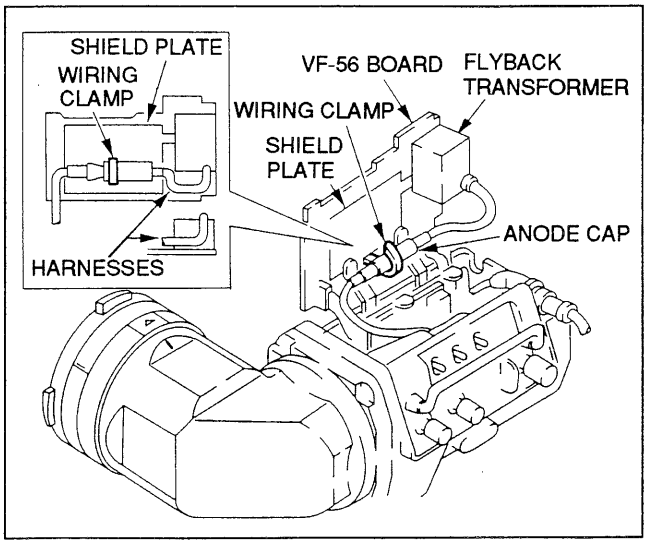
NOTE
Push the slackened narnesses in the unit.



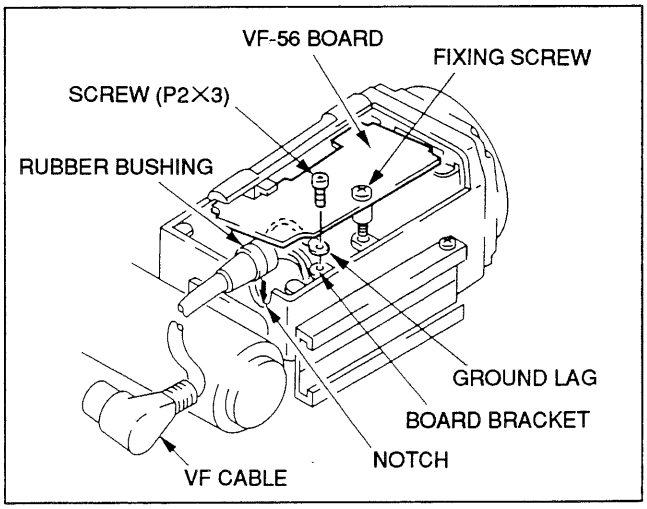
9. Insert the high-voltage cable into the anode cap on the VF-56 board until it is locked.



10. Bundle the anode cap using the wiring clamp on the VF-56 board and draw it to the flyback transformer side.



11. Attach the ground lug of the VF cable in the board bracket with one screw.
12. Insert the rubber bushing of the VF cable so that it fit to the notch, then fix the VF-56 board with one screw.
    40×10^{-2} N•m (4.0 kgf•cm)



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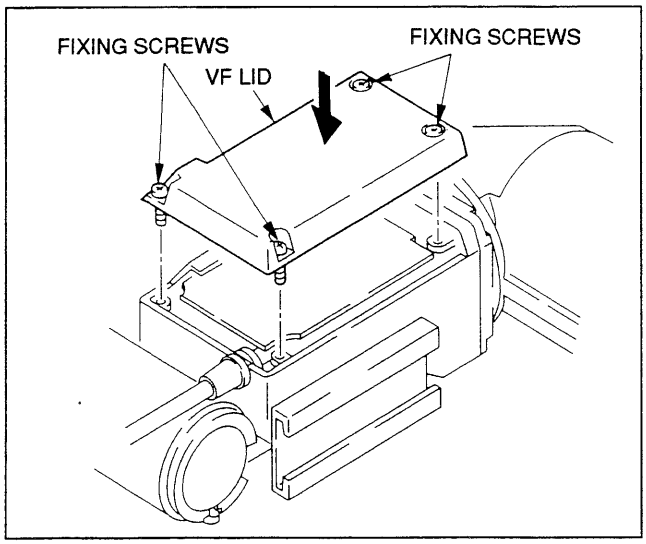
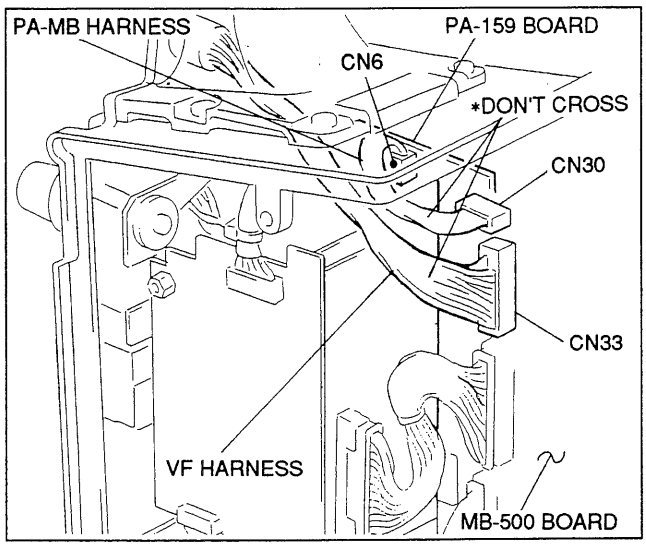
13. Attach the VF lid with four screws.
    30×10⁻² N•m (3.0 kgf•cm)



1-7-2. PA-MB Harness Drawing

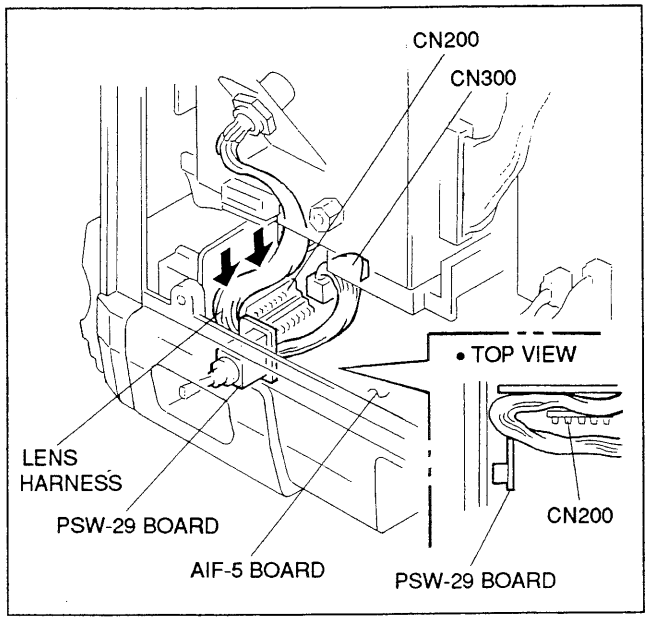
1. Connect the harnesses connecting to the VF board to connector CN33 on the MB-500 board.
2. Connect the CN6 harness of the PA-159 board to connector CN30 on the MB-500 board.

NOTE
Take care that the VF harness does not cross with the PA-MB harness.



1-7-3. Lens Harness Drawing

1. Connect the lens harness of the front panel to connector CN300 on the AIF-5 board.
2. Put the lens harness between the CN200 connector on the AIF-5 board and the PSW-29 board, and push it fully in the direction indicated by the arrow.

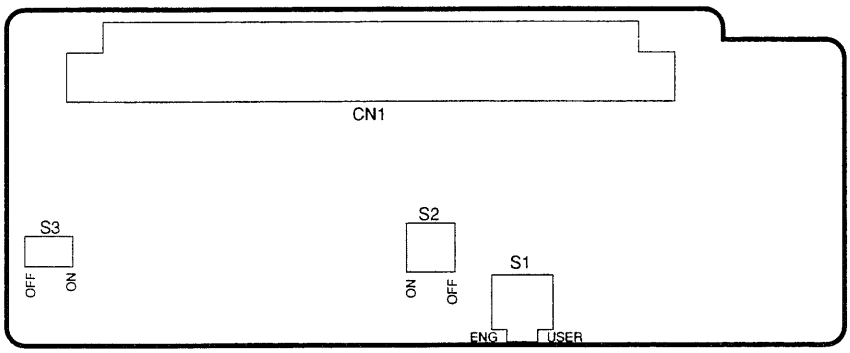


1-8. SETTING THE SWITCHES AND SHORT PINS ON BOARD

NOTE

For the factory-use switch,do not change the switch setting.

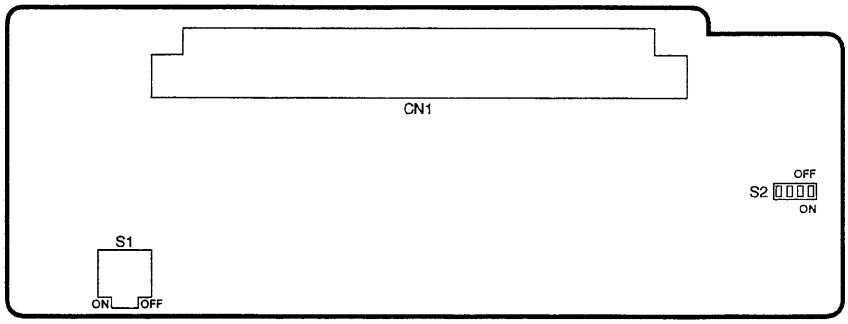
AT-84 Board



A side

Switch No.	Name	Description	Factory setting
S1	Set menu mode selector switch	ENG : Engineer mode USER: User mode	USER
S2	—	Factory use	ALL OFF
S3	Memory backup switch	Selects whether to back up or erase the automatic white and black balance data that a microcomputer memorizes. ON : Backs up the data OFF: Erases the backup data	ON

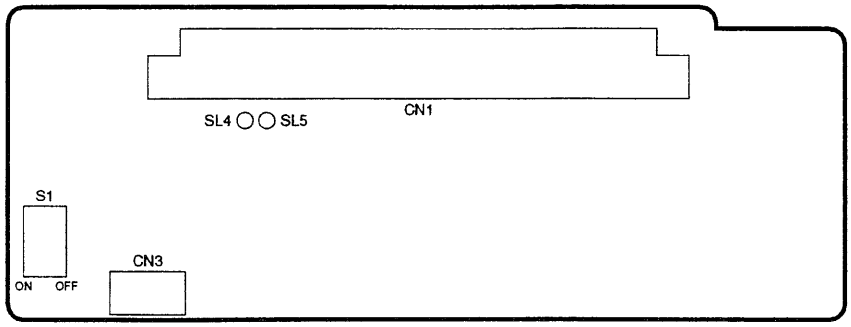
IF-443 Board



A side

Switch No.	Name	Description	Factory setting
S1	Displays a character signal when the output signal at the TEST OUT terminal appears.	ON : Displays the character signal OFF: Displays no character signal	OFF
S2	Initializing switch	Factory use	OFF

SY-191 Board



A side

Switch on SY-191 board

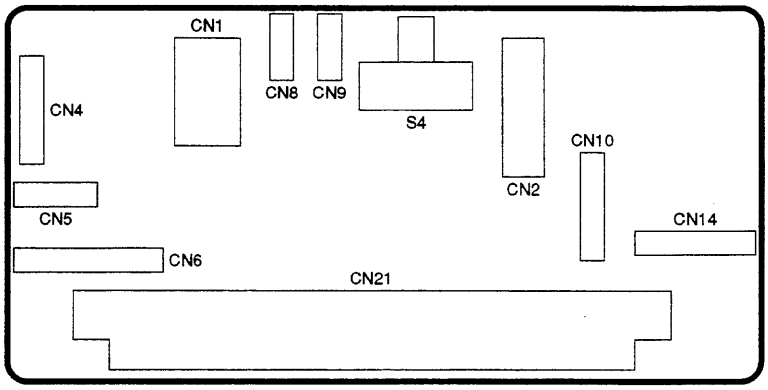
Switch No.		Name	Description	Factory setting
S1	1	NTSC/PAL mode selector switch	OFF : NTSC mode ON : PAL mode	NTSC : OFF PAL : ON
	2 to 8	—	NOT USE	OFF

Slit Lands on SY-191 Board

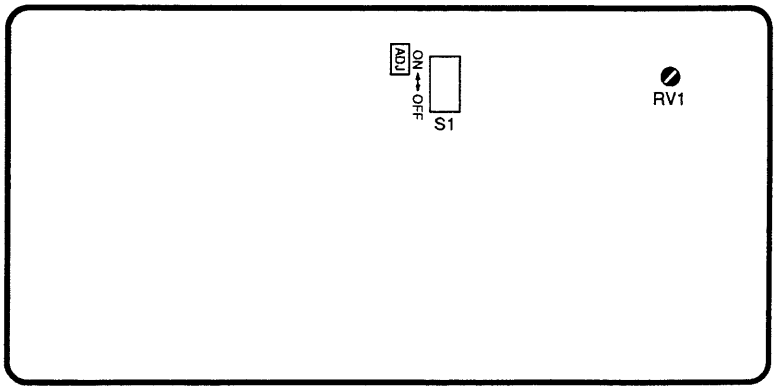
The slit lands select the back tally.

Ref. No.	During REC : Lights During Alarm: Blinks (Factory setting)	During REC: Lights
SL4	SHORT	OPEN
SL5	OPEN	SHORT

HN-189 Board



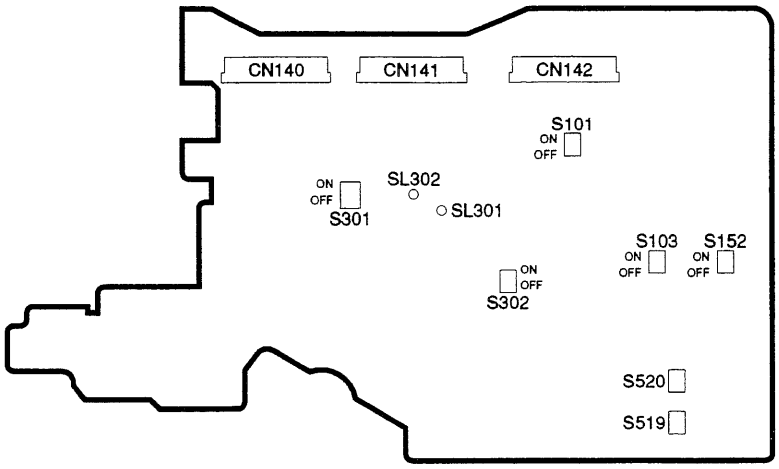
A side



B side

Switch No.		Name	Description	Factory setting
S1	1/2	ADJ	Turns on or off the adjustment mode. D7 lights when the mode is on. ON : Enables the adjustment mode OFF: Disables the adjustment mode	OFF
	2/2	TRK	Turns on or off the tracking control. D8 lights when the control is on. ON : Enables the tracking control volume (RV1) OFF: Disables the tracking control volume (RV1)	OFF
S4		REC head PB selector switch	Selects the normal REC and REC head PB. REC : Normal REC TEST: REC head PB	REC

TC-75 Board



B side

Switches on TC-75 board

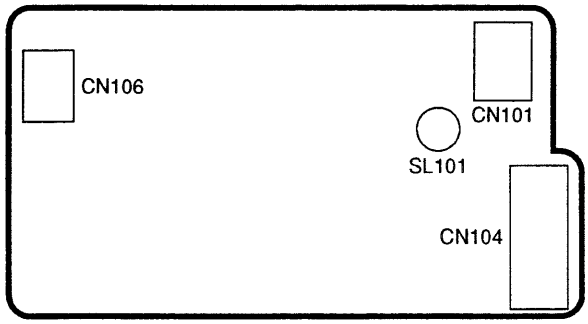
Switch No.	Name	Description	Factory setting
S101	CH-1 FRONT MIC VR ON-OFF	Selects whether to adjust the CH-1 audio input signal level by the MIC VR. ON : Adjusts the audio signal level OFF: Adjusts no audio signal level	OFF
S103	CH-1 LIM ON-OFF	Selects whether to turn on or off the limiter in the CH-1 audio input stage. ON : CH1 Audio INPUT LIMITER ON OFF: CH1 Audio INPUT LIMITER OFF	OFF
S152	CH-2 LIM ON-OFF	Selects whether to turn on or off the limiter in the CH-2 audio input stage. ON : CH2 Audio INPUT LIMITER ON OFF: CH2 Audio INPUT LIMITER OFF	OFF
S301	CUE ON-OFF	Selects whether to output a CUE signal or output a D/A(Digital to Analog) signal to the audio output terminal in the PB mode. ON : Outputs the CUE signal OFF: Output the D/A signal	OFF
S302	OUTPUT LIM ON-OFF	Selects whether to turn on or off the output limiter. ON : Turns on the audio output limiter OFF: Turns off the audio output limiter	ON
S519	EXT-LK UBIT INT-EXT	Selects whether to lock the user bit externally. INT : Not locks to externally EXT: Locks to externally	INT
S520	REAL TIME VITC-LTC	Selects whether to record the real time in a VITC or LTC user bit. VITC: VITC user bit LTC : LTC user bit	VITC

Slit Lands on TC-75 Board

The slit lands are used for selection of 0 dBm or +4 dBm output level.

Ref. No.	Output level (dBm/600 Ω)	
	+4 dBm	0 dBm (Factory setting)
SL301	SHORT	OPEN
SL302	SHORT	OPEN

PS-333 Board



B side

SL101

SL101 is used to select the battery and external power supply.

Slit short : Supplies electric power from the battery to the unit when the external supply voltage is lower than the battery voltage.

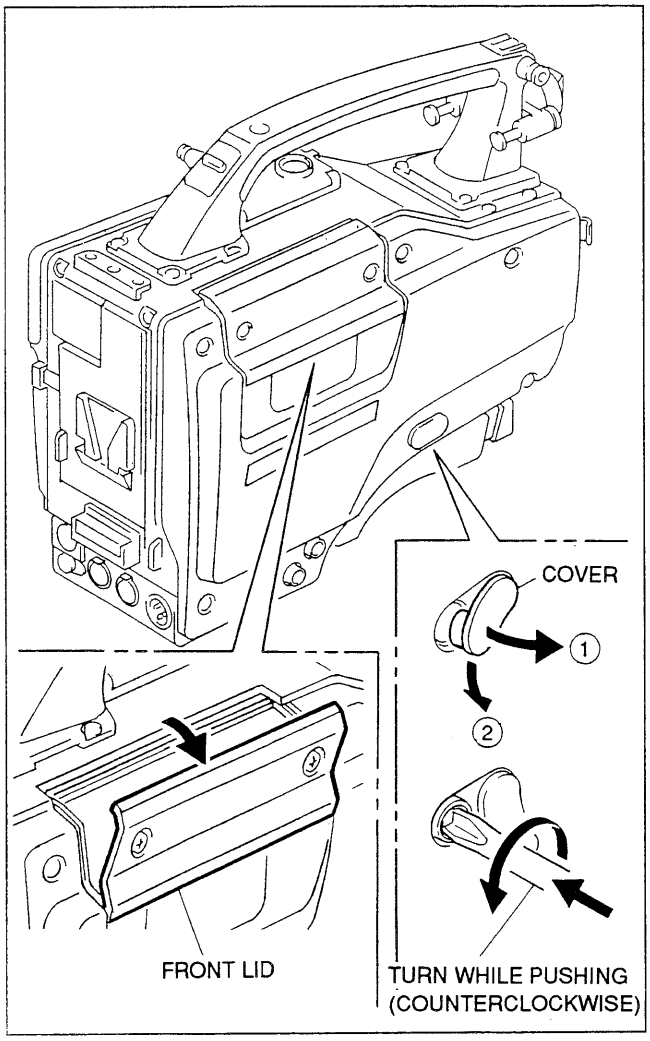
Slit open : Supplies electric power from the external power to the unit irrespective of the voltage level when the electric power is supplied from the external power.

Unit power supply

Slit \ Input voltage		**EXT DC > BATT**	**EXT DC < BATT**
SL101	SHORT	EXT DC	BATT
	OPEN (Factory setting)	EXT DC	EXT DC

1-9. EJECTING THE CASSETTE TAPE MANUALLY

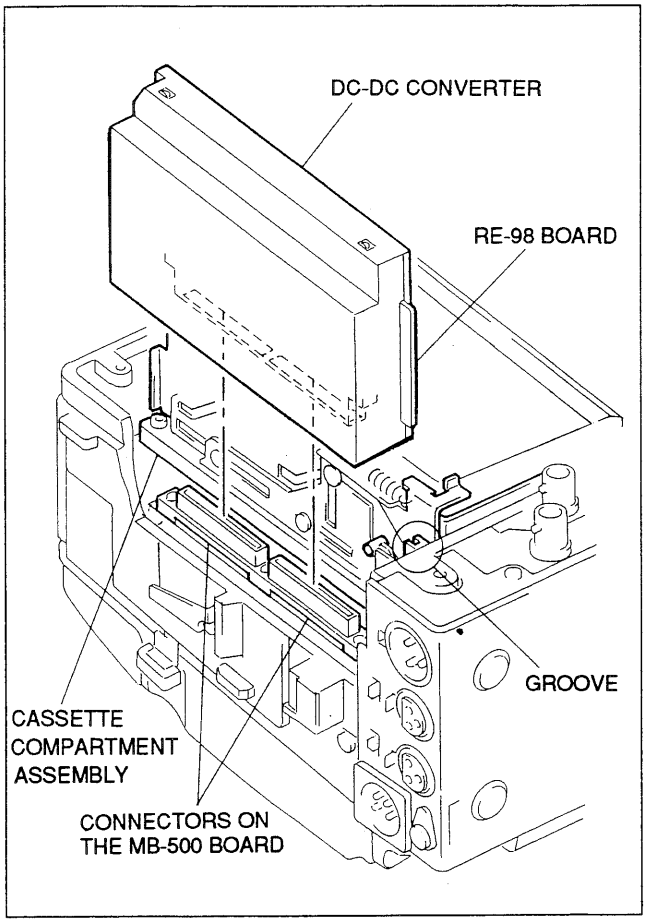
1. Turn off the power.
2. Open the cover of the outside panel shown in the figure.
3. Turn the gear counterclockwise until the front lid opens while pushing a gear using a Phillips screwdriver.
4. The front lid opens. The cassette tape can then be ejected.



NOTES
- Do not turn the gear after the front lid opened.
- In the state mentioned above, the front lid cannot be closed and locked.
  Perform step (1) or (2) below before closing the front lid.
  (1) Turn on the power.
  (2) Turn the gear slightly in the clockwise direction.

If the above operation cannot be executed, perform the following procedure.

1. Remove the front lid and outside panel.
   (Refer to section 1-5.)
   Remove the DC-DC converter.



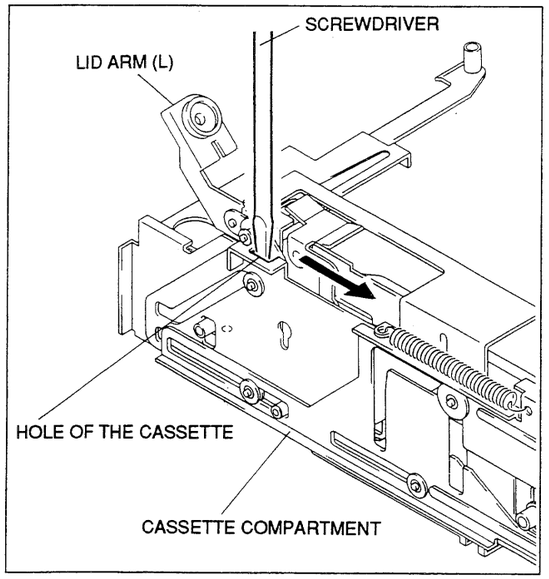
2. Put the cassette compartment into the cassette-up state with the cassette lid of the tape raised.
   (For more details, refer to section 1-6.)
3. Remove the cassette tape taking care that it is not damaged.

NOTE
When installing the DC-DC converter, fit the projection of the RE-98 board to the groove of the chassis, and push it down firmly.

1-10. INSERTING THE CASSETTE TAPE WHEN THE OUTSIDE PANEL IS REMOVED

1. Place the cassette compartment into the up state. (Refer to section 1-6.)
2. Insert a cassette tape in the cassette compartment.
3. Insert a screwdriver into the hole of the cassette compartment shown in the figure, move it in the direction indicated by the arrow until it locks into place.

NOTE
Never push the lid arm(L) when placing the cassette compartment into the down state.



1-11. CLEANING WHEN THE HEADS ARE CLOGGED

If the video heads are clogged, clean the heads as the following procedure.
If the video heads are clogged after cleaning by cleaning tape, clean them by cleaning cloth.

1-11-1. How to Cleaning by Cleaning Tape

NOTE
Make sure to use the cleaning tape BCT-D12CL. If the cleaning is performed by other cleaning tape, the BCT-D12CL, unusual wearing or damage of the video head may occur.

1. Insert the cleaning tape BCT-D12CL in the unit.
2. Press the PLAY button.
   Head cleaning starts.
3. After 5 seconds, press the EJECT button.
4. The cleaning tape will be ejected.

   NOTE
   Be sure to eject the cleaning tape after cleaning to avoid damages to the heads.

5. Confirm that the head clog is clear.

1-11-2. How to Cleaning by Cleaning Cloth

CAUTIONS
- Turn off the power before cleaning.
- Each block in the mechanical deck consistes of a precision part and is adjusted precisely. Be careful not to damage each part and to apply an excessive force during cleaning.
- Do not touch the greased portions during cleaning. If grease attaches to a cleaning cloth, replace the cleaning cloth by new one. If a cleaning cloth smeared with grease is used, grease may attach to the places where it should not.
- Do not insert a cassette tape before a cleaning fluid completely evaporates after cleaning.
- Be sure to rotate the upper drum counterclockwise during cleaning. Clean the upper drum along the circumference. If the upper drum is cleaned in the vertical direction, the rotary heads may be damaged.

Tools
- Cleaning cloth : 3-184-527-01
- Cleaning fluid : 9-919-573-01

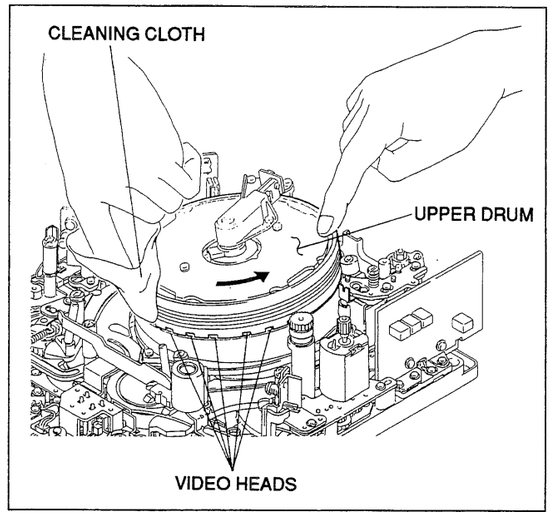
CAUTION
Do not use a cotton swab to clean the rotary heads.

Cleaning the Video Heads

Procedure
1. Remove the front lid and outside panel.
   (Refer to section 1-5.)
2. Press the cleaning cloth moistened with cleaning fluid slightly against the position of the rotary heads installation height.

   NOTES
   - Never press the cleaning cloth with wrinkle to the video head during cleaning.
   - Keep the cleaning cloth from contact with the rotary heads.

3. Rotate the upper drum slowly in the counterclockwise direction by hand and clean it.
4. After cleaning, wipe the upper drum with dry cleaning cloth.



Cleaning the Stationary Heads and Tape Guides

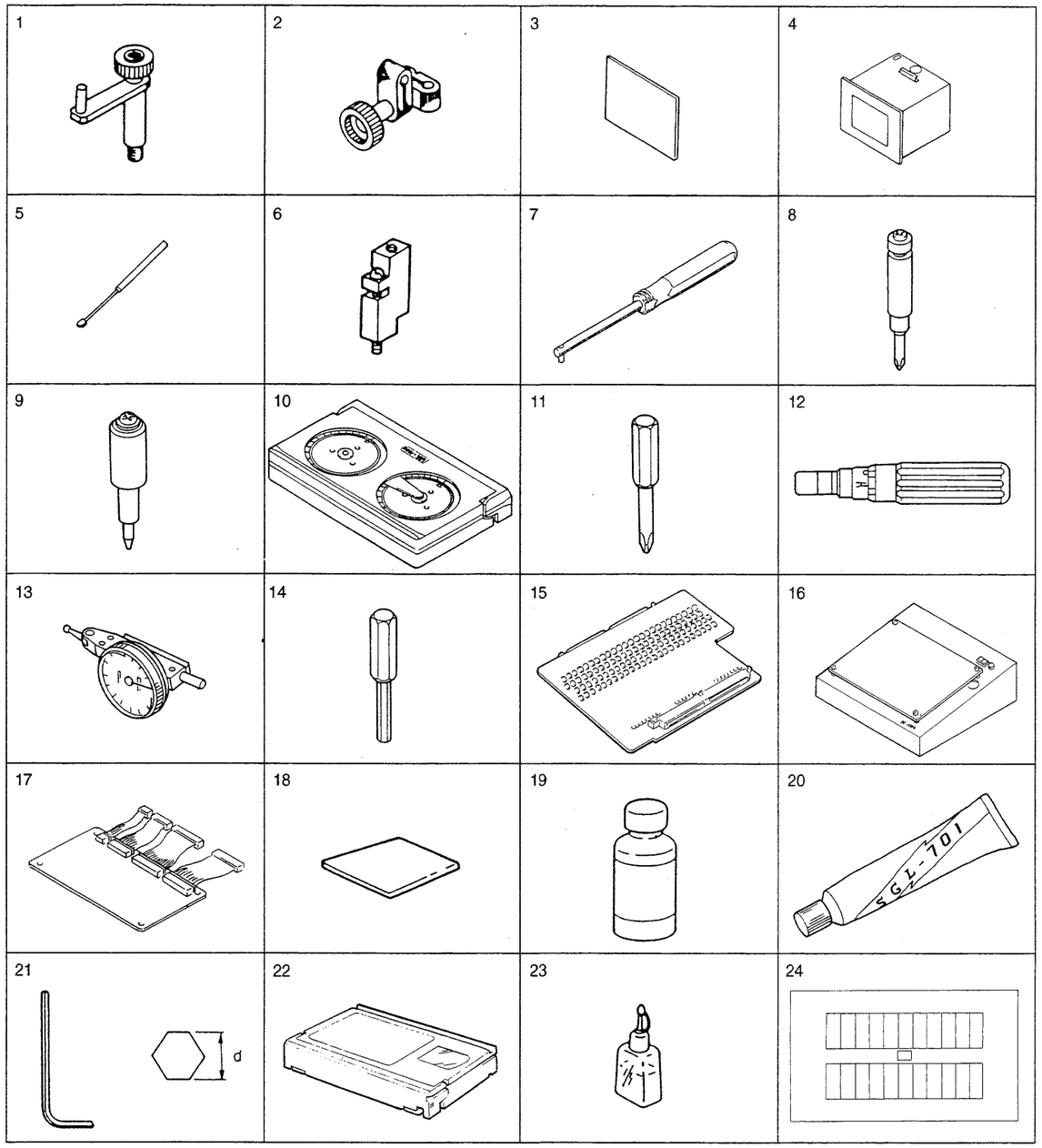
Procedure
1. Remove the front lid and outside panel.
   (Refer to section 1-5.)
2. Wipe the sationary heads and tape guides using the cleaning cloth moistened with cleaning fluid.
3. After cleaning, wipe the stationary heads and tape guides with dry cleaning cloth.

1-12. FIXTURE AND MEASURING EQUIPMENT FOR ADJUSTMENT

1-12-1. Fixture

Fig. No.	Part No.	Description	For use
1	J-6001-820-A	DRUM ECCENTRICITY GAUGE (3)	Upper drum eccentricity adjustment
2	J-6001-830-A	DRUM ECCENTRICITY GAUGE (2)	
3	J-6026-100-A	RESOLUTION CHART	Camera measurement of pick-up tube response
	J-6026-130-B	GRAY SCALE CHART (4:3)	Adjustment of camera
4	J-6029-140-B	PATTERN BOX, PTB-500	Adjustment of camera
5	J-6080-840-A	INSPECTION MIRROR	Video tracking adjustment
6	J-6087-000-A	DRUM ECCENTRICITY GAUGE (5)	Upper drum eccentricity adjustment
7	J-6309-350-A	CARD BOARD EXTRACTION TOOL	Removal of plug-in board
8	J-6322-420-A	TAPE GUIDE ADJUSTMENT DRIVER (45)	Tape path adjustment
9	J-6323-530-A	STOP WASHER FASTENING TOOL	Installation of stop washer
10	J-6323-890-A	FWD BACK TENSION MEASURING CASSETTE	FWD back tension adjustment
11	J-6325-110-A	TORQUE DRIVER BIT (FOR M1.4)	Tightening screws
	J-6325-380-A	TORQUE DRIVER BIT (FOR M2)	
12	J-6325-400-A	TORQUE DRIVER (FOR 3 kg)	
13	J-6325-530-A	DRUM ECCENTRICITY GAUGE (6)	Upper drum eccentricity adjustment
14	J-6326-120-A	HEXAGON BIT	Tightening screws
15	J-6420-260-A	EXTENSION BOARD, EX-410	Plug-in board check and adjustment
16	J-6420-840-A	CHANNEL CONDITION CHECKER	REC current adjustment
17	J-6420-910-A	TP TOOL	Video tracking adjustment
18	3-184-527-01	CLEANING CLOTH	Cleaning
19	7-661-018-18	OIL	
20	7-662-010-08	GREASE (SGL-701)	
21	7-700-736-05	HEXAGON WRENCH (1.5mm)	Removal of screw
22	8-960-073-01	ALIGNMENT TAPE, ZR5-1	Digital video and audio adjustments (for NTSC)
	8-960-073-11	ALIGNMENT TAPE, ZR2-1	Tracking adjustment (for NTSC)
	8-960-073-51	ALIGNMENT TAPE, ZR5-1P	Digital video and audio adjustments (for PAL)
	8-960-073-61	ALIGNMENT TAPE, ZR2-1P	Tracking adjustment (for PAL)
23	9-919-573-01	CLEANING FLUID	Cleaning
24	J-6394-080-A	GRAY SCALE CHART (16:9)	Adjustment of camera (for DVW-700WS/700WSP)

1-12-1. Fixture



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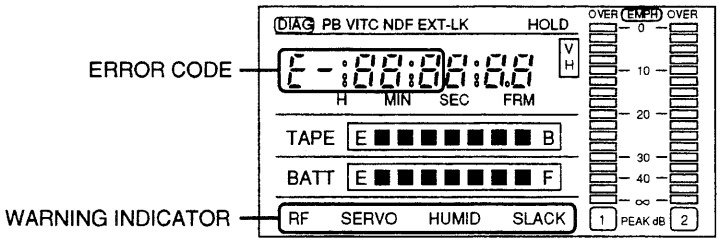
1-12-2. Measuring Equipment

It is recommended to use the measuring equipments listed below or the equivalents.
Each equipment is available as a standard product.

Equipment	Model Name	Remarks
AC adaptor or battely	SONY AC-550(for NTSC) / AC-550CE(for PAL)	
Regulated DC Power Supply		variable voltage 12V, more than 5A
Oscilloscope	TEKTRONIX 2465B	
Wave Form/Vector Monitor	TEKTRONIX 1750(for NTSC) / 1751(for PAL)	for measuring analog composit SCH
Audio Analyzer	TEKTRONIX AA501A(OP.02)	for measuring distortion and levels
Audio Level Meter	HEWLETT PACKARD HP3400A	
Low Frequency Oscillator	HEWLETT PACKARD HP8904	
Frequency Counter	ADVANTEST TR5821AK	
Digital Voltmeter	ADVANTEST TR6845	
Black and White Monitor (Horizontal resolution more than 900) Color Monitor	SONY BVM-1911 / 2811(for NTSC) SONY BVM-2011P / 3011P(for PAL)	

SECTION 2
ERROR CODE AND ERROR MESSAGE

2-1. ERROR CODE



LCD DISPLAY SCREEN

WARNING INDICATORS

The warning indicators on the LCD screen light if any fault occurs during the power-on sequence or normal operation.

RF : Lights if the recording heads are clogged.
SERVO : Lights if the servo is unlocked.
HUMID : Lights if the condensation occurs on the head drum.
SLACK : Lights if the tape is not wound properly or the following troubles (refer to "ERROR CORDES") are occured.

ERROR CODES

When "SLACK" of the warning indicator lights, its error cause and error mode are displayed on the LCD screen.

E-XXX

MODE

1: REC
2: REC PAUSE
3: THREAD
4: UNTHREAD
5: STOP
8: PLAY
9: FF
A: REW
b: REC REVIEW
C: CUE UP
E: FF SEARCH
F: REW SEARCH

ERROR CAUSE

10: Drum drive voltage abnormality
11: Detects no drum FG
12: Detects no drum PG
20: Capstan drive current abnormality
21: Detects no capstan FG-A
22: Detects no capstan FG-B
23: Capstan rotation abnormality in forward and reverse directions
24: Capstan speed abnormality (high speed)
32: Detects no S reel FG
42: Detects no T reel FG
61: Fuction cam rotation overtime in the forward direction
62: Fuction cam rotation overtime in the reverse direction
63: Tape top sensor overtime
70: Servo NVRAM checksum error
71: Communication error between servo CPUs

2-2. ERROR MESSAGE

The error message is superimposed on the viewfinder screen if any fault occurs during the power-on sequence or normal operation.

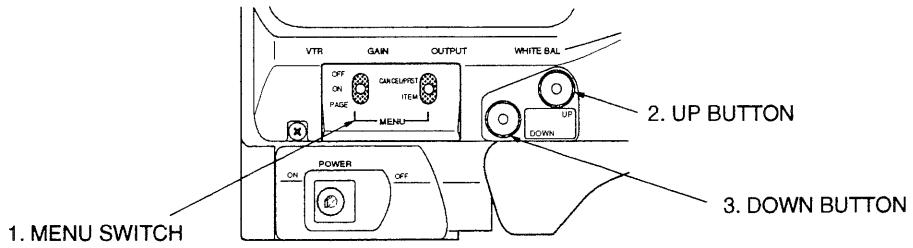
ERROR MESSAGE	OPERATION	REMEDY
:MEMORY NG	Blinks on the viewfinder screen for about three seconds during the power-on sequence.	The white and/or black balance memory data have been lost. Adjust the white and black balance again.
CAM?	Displayed during the power-on sequence or normal operation.	A fault has been detected in the camera. Perform the DIAGNOSTIC mode.
VTR?	Displayed during the power-on sequence or normal operation.	A fault (HUMID or SLACK) has been detected in the VTR. Check the warning indicators on the LCD screen.

SECTION 3
MAINTENANCE MODE

3-1. SETUP MENU

The DVW-700/700P has the SETUP menu required for the settings and adjustments of the camera.
This section describes the ENG (engineering) mode.

SWITCH AND BUTTONS



1. MENU switch

OFF	: Press to exit the SETUP menu. Usually, set to OFF.
ON	: Press to enter the the SETUP menu.
PAGE	: Press to search each page of the SETUP menu.
CANCEL/PRST	: Press to cancel the setting value (during level control) or to return the value to the factory-setting value.
ITEM	: Press to select each item.

2. UP button
Press to increment the setting of the selected item or select ON.

3. DOWN button
Press to decrement the setting of the selected item or select OFF.

OPERATION

The SETUP menu is set to the USER mode at the factory.
To enter the ENG mode, perform the following procedure.

1. Turn the power off.
2. Set to the ENG/USER switch in the front of the AT-84 board to ENG (upper).
3. Turn the power on.

1. Set the MENU switch to ON. The SETUP menu is then displayed on the viewfinder screen.
   NOTE The first page is displayed when the setup menu is first used.
   The lastly displayed page appears when it is used second time or later.
2. To shift the page one at a time, set the MENU switch to PAGE.
3. To shift the item, set the MENU switch to ITEM. The cursor (arrow) moves down to each item one at a time.
4. To change the set item, press the UP or DOWN button.
5. To exit the setup menu, set the MENU switch to OFF.
   NOTE When the unit is controlled by remote control unit RM-P9, some functions cannot be controlled. (Refer to pages 3-11 to 3-13.)

Setup Menu Configuration

VIEWFINDER SCREEN (Factory setting)	DESCRIPTION
* MARKER 1/2 *	
SAFETY ZONE : ON	Sets of the safety zone marker display to ON or OFF.
SAFETY AREA : 90%	Sets the safety zone area to 80% or 90%.
CENTER : ON	Sets the center marker display to ON or OFF.
CENTER H	Moves the center marker horizontally.
CENTER V	Moves the center marker vertically.
* MARKER 2/2 *	
BOX CURSOR : OFF	Sets the box cursor display to ON or OFF. ※ 1
BOX WIDTH	Changes the width of the box cursor.
BOX HEIGHT	Changes the height of the box cursor.
BOX H	Moves the box cursor horizontally.
BOX V	Moves the box cursor vertically.
*** VF DISPLAY ***	
DISP MODE : 3	Can set whether to display the item partially or to display no item. (1/2/3) For details, refer to the Operation Manual.
EXTENDER : ON	Sets the extender display to ON or OFF.
ZOOM : ON	Sets the zoom position display to ON or OFF.
FILTER : ON	Sets the filter display to ON or OFF.
WHITE : ON	Sets the white balance memory display to ON or OFF.
GAIN : ON	Sets the gain selector value display to ON or OFF.
SHUTTER : ON	Sets the shutter speed/mode display to ON or OFF.
TAPE : ON	Sets the tape remaining display to ON or OFF.
IRIS : ON	Sets the iris value display to ON or OFF.
CAMERA ID : ON	Sets the camera ID display to ON or OFF. **NOTE** This item is displayed only when the MENU switch is set to ON and the OUTPUT/DCC selector switch is set to BARS.
*** MASTER GAIN ***	Sets the gains corresponding to the low, middle and high positions of the gain selector switch. Values -3, 0, 3, 6, 9, 12, 18, 24, or 30 dB can be set for each gain. **CAUTION** When the gain selection value is changed, the black set adjustment is required.
LOW : 0 dB	
MID : 9 dB	
HIGH : 18 dB	
*** CAMERA ID ***	Sets the camera ID of up to ten alphanumeric characters, symbols, and spaces.
ID : □□□□□□□□□□	
*** SHUTTER SPEED ***	Sets the shutter speed/mode selection range.
*CLS	CLS : Clear scan mode ECS : Extended clear scan mode **NOTE** Either CLS or ECS mode is set, depending on the shutter speed set on the "CLEAR SCAN" page.
*EVS	Super Enhanced Vertical Definition mode
*1/100 (for NTSC) or 1/60 (for PAL)	Shutter speed 1/100 (for NTSC) or 1/60 (for PAL) second in the Standard mode
*1/125	Shutter speed 1/125 second in the Standard mode
*1/250	Shutter speed 1/250 second in the Standard mode
*1/500	Shutter speed 1/500 second in the Standard mode
*1/1000	Shutter speed 1/1000 second in the Standard mode
*1/2000	Shutter speed 1/2000 second in the Standard mode

※ 1:When set the "16:9/4:3 MODE" to 16:9 and "BOX/4:3 LIMIT" to 4:3 at WIDE SCREEN page, the box cursor is not functioned, and the display turns to "4:3" in this area. (DVW-700WS/WSP only)

VIEWFINDER SCREEN (Factory setting)	DESCRIPTION
*** CLEAR SCAN *** 60.1 Hz (for NTSC) or 50.2 Hz (for PAL)	Sets the shutter speed in the clear scan mode (over 60 Hz for NTSC or over 50 Hz for PAL) and the extended clear scan mode (up to 60 Hz for NTSC or up to 50 Hz for PAL). CLS : 260 speeds in the range of 60.1 to 7000 Hz (for NTSC) 310 speeds in the range of 50.2 to 9000 Hz (for PAL) ECS : 248 speeds in the range of 30.4 to 58.3 Hz (for NTSC) 295 speeds in the range of 25.4 to 48.7 Hz (for PAL)
***'!' LED ***	
*GAIN	Sets whether or not the ⓘ indicator LED on the viewfinder lights when the gain is not 0 dB.
*SHUTTER	Sets whether or not the ⓘ indicator LED on the viewfinder lights when the SHUTTER selector switch is set to ON.
WHITE PRESET	Sets whether or not the ⓘ indicator LED on the viewfinder lights when the white balance memory is preset.
*EXTENDER	Sets whether or not the ⓘ indicator LED on the viewfinder lights when the lens extender is used.
FILTER	Sets whether or not the ⓘ indicator LED on the viewfinder lights when the FILTER selector is set to value other than 1B. (Usually, set to 1B.)
A. IRIS OVERRIDE	Sets whether or not the ⓘ indicator LED on the viewfinder lights when the reference value of the automatic iris adjustment is set to ones other than the standard value.
*** SETUP CARD ***	
READ (→CAM)	Reads the data from the setup card.
WRITE (→CARD)	Writes the data in the setup card.
WRITE PROTECT:	Sets the WRITE PROTECT function to the setup card.
ID EDIT	Sets the setup card ID.
** FUNCTION 1/2 **	
DETAIL : ON	Sets whether to add the detail signal for resolution improvement to the video signal. **NOTE** The level adjustment for this item is performed on the "LEVEL 1/9" page.
SKIN TONE DTL : OFF	Sets whether to activate the skin tone detail circuit. **NOTE** The level adjustment for this item is performed on the "LEVEL 2/9" page.
APERTURE : ON	Sets the aperture correction to ON or OFF.
MATRIX : OFF (for NTSC) ON (for PAL)	Sets whether to activate the linear matrix circuit. The highly-saturated colorimetry can be obtained when this item is set to ON. **NOTE** The level adjustment for this item is performed on the "LEVEL 8/9" page.
GAMMA : ON	Sets whether to perform the gamma correction so that the overall characteristic of signals between the camera and monitor is "$\gamma=1$". **NOTE** The level adjustment for this item is performed on the "LEVEL 3/9" and "LEVEL 5/9" pages.
CHROMA : ON	Sets whether to add the chroma signal. **NOTE** The level adjustment for this item is performed on the "LEVEL 4/9" page.
TEST SAW : OFF	Sets whether to close the lens forcibly and add the TEST SAW waveform to the video signal circuit. This signal is used for the video signal system adjustment.
CROSS COLOR FLT : OFF (for NTSC only)	Sets whether to reduce the cross color of a video signal. The cross color is reduced when this item is set to ON.

VIEWFINDER SCREEN (Factory setting)	DESCRIPTION
** FUNCTION 2/2 **	
GENLOCK : ON	Sets whether to make the internal reference signal synchronize with the video signal that input to the GENLOCK IN connector.
CAM RET. : OFF	Sets whether to display the return video signal input to the GENLOCK IN connector on the viewfinder screen by setting the RET button to ON.
FILTER INH. : OFF	Sets whether to make the corrected values of the white balance correspond to the filter. ON : Only two values; one for memory A and one for memory B can be stored. The corrected values will not correspond to the selection of the color temperature conversion filter. OFF : Up to eight values; four for memory A and four for memory B can be stored. The corrected values are stored in memory A and B for every color temperature conversion filter.
FIELD/FRAME : FLD	Sets the CCD read system. FLD : Field read mode. Normally setting. FRM : Frame read mode. The vertical resolution is improved. **NOTE** In the frame read mode, an after-image appears compared with the field read mode.
A. IRIS OVERRIDE : OFF	Sets whether to activate the auto iris override function. When this item is set to ON, the reference value of the auto iris adjustment can be changed using the UP or DOWN button during menu OFF setting. (Five steps: Irises off -1/2, -1/4, 0, +1/4, and +1/2)
*** TEST OUT *** ENC R G B	Sets the type of the video signal output from the TEST OUT connector. ENC : Outputs a VBS signal to the TEST OUT connector R : Outputs an Rch signal to the TEST OUT connector G : Outputs a Gch signal to the TEST OUT connector B : Outputs a Bch signal to the TEST OUT connector R-G : Outputs an R-G signal to the TEST OUT connector B-G : Outputs a B-G signal to the TEST OUT connector **NOTE** The R-G and B-G items are displayed and can be selected when "R-G/B-G SEL" item on the "OPERATION MODE" page is set to ON.
* WIDE SCREEN *	DVW-700WS/WSP only
16:9/4:3 MODE : 16:9	Sets the aspect ratio of the video signal output from the VIDEO OUT and TEST OUT connectors.
VF ASPECT : AUTO	Sets the aspect ratio on the VF. AUTO : Sets the aspect ratio set by the 16:9/4:3 MODE setting. 4:3 : Sets the aspect ratio to 4:3 regardless of "16:9/4:3 MODE" setting.
BOX/4:3 LIMITS : BOX	Sets the function of the box cursor. BOX : Operates as the normal box cursor function. 4:3 : Displays the area of 4:3 mode when the "16:9/4:3 MODE" set to 16:9.
"16:9" BARS ID : OFF	Sets whether to add the "16:9" character in the color bars signal generated in this unit when the "16:9/4:3 MODE" to 16:9.
"16:9" VF ID : OFF	Sets whether to add the "16:9" character on the VF screen when the "16:9/4:3 MODE" set to 16:9.
* LEVEL 1/9 <16:9 MODE>	Sets the aspect ratio to 16:9 and 4:3 respectively for this page adjustment. (DVW-700WS/WSP only)
DETAIL LEVEL : 0	Sets the total level of the detail signal.
V DTL LEVEL : 0	Sets the level of the V detail. The H/V ratio is adjusted using this item.
H DTL FREQ. : 0	Sets the frequency of the H detail.
V DTL BLK CLIP : 0	Sets the clipping level in the negative (-) direction of the V detail.
DTL WHT CLIP : 0	Sets the clipping level in the positive (+) direction of the H detail.
DTL BLK CLIP : 0	Sets the clipping level in the negative (-) direction of the H detail.
CRISPENING : 0	Sets the crispening level of the detail signal.
LEVEL DEPEND. : 0	Sets the level of the skin tone detail amount in the low level.
KNEE APERTURE : 0	Sets the detail level after the gamma correction.
APERTURE LEVEL : 0	Sets the high-frequency correction level.

VIEWFINDER SCREEN (Factory setting)	DESCRIPTION
* LEVEL 2/9	
SKIN TONE HUE : 119 SKIN TONE DTL : 0 SAT. CENTER (S) : 0 HUE. CENTER (H) : 0 SAT. RANGE (dS) : 0 HUE. RANGE (dH) : 0	Sets the skin tone detail range and amount.
SKIN TONE IND : OFF	Sets whether to display the skin tone detection area. On the viewfinder screen, the normal zebra pattern is set to OFF and displayed in the detection area. A black-and-white pattern is displayed in the detection area when a video signal is output. This item cannot be selected when the OUTPUT/DCC selector switch is set to BARS. The indicator is automatically set to OFF when the page is changed or when the MENU switch is set to OFF.
SKIN TONE DTL : OFF	Sets whether to activate the skin tone detail function. **NOTE** This item is the same as the "SKIN TONE DTL" item on the "FUNCTION 1/2" page.
* LEVEL 3/9	
MASTER BLACK : 0	Sets the black level.
MASTER GAMMA : 0	Sets the gamma correction curve.
KNEE : ON	The knee correction. The knee correction is forcibly canceled regardless of DCC ON/OFF setting when this item is set to OFF.
KNEE POINT : 0 KNEE SLOPE : 0	Used for the manual knee adjustment. Sets the knee point and slope.
WHITE CLIP : ON	The white clip is forcibly canceled when this item is set to OFF. Used for the video system adjustment.
WHT CLIP LEVEL : 0	Sets the white clip level.
ZEBRA1 DETECT : 67	Sets the center level of the zebra 1 pattern. Displays about ±2% area of the reference level.
ZEBRA2 : OFF	Sets whether to display the zebra 2 pattern simultaneously with the zebra 1 pattern.
ZEBRA2 DETECT : 100	Sets the lower-limit level of the zebra 2 pattern. The upper-limit level is the white clip level.
* LEVEL 4/9	
I (for NTSC) or R-Y (for PAL) BURST LEVEL : 0 Q (for NTSC) or B-Y (for PAL) BURST LEVEL : 0 I (for NTSC) or R-Y (for PAL) CHROMA LEVEL : 0 Q (for NTSC) or R-Y (for PAL) CHROMA LEVEL : 0	Used for the chroma adjustment of the encoder.
I (for NTSC) or R-Y (for PAL) : ON	Sets whether to add the I (for NTSC) or R-Y (for PAL) signal to the encoder circuit.
Q (for NTSC) or B-Y (for PAL) : ON	Sets whether to add the Q (for NTSC) or B-Y (for PAL) signal to the encoder circuit. **NOTE** The setting of the "CHROMA" item on the "FUNCTION 1/2" page has priority over the ON/OFF setting of the "I" and "Q" (for NTSC) items, or "R-Y" and "B-Y" (for PAL) items. When this item is set to ON, it automatically returns to ON by changing the page or setting the MENU switch to OFF even if the "I" or "R-Y" item is to OFF. This item automatically returns to OFF when the "CHROMA" item is set to OFF.
ENC Y LEVEL : 0	Sets the Y level of the encoder output.
ENC SETUP LEVEL : 0 (for NTSC only)	Sets the setup level of the encoder output.

VIEWFINDER SCREEN (Factory setting)	DESCRIPTION
* LEVEL 5/9 R BLACK : 0 G BLACK : 0 B BLACK : 0 R FLARE : 0 G FLARE : 0 B FLARE : 0 R GAMMA : 0 G GAMMA : 0 B GAMMA : 0 TEST OUT : ENC	Sets the R/G/B black level. Sets the R/G/B flare correction amount. Sets the R/G/B gamma correction curve. Sets the type of the video signal output from the TEST OUT connector. ENC: Outputs a VBS signal to the TEST OUT connector. R : Outputs an Rch signal to the TEST OUT connector. G : Outputs a Gch signal to the TEST OUT connector. B : Outputs a Bch signal to the TEST OUT connector. R-G : Outputs an R-G signal to the TEST OUT connector. B-G : Outputs a B-G signal to the TEST OUT connector. **NOTE** This items is the same as the "TEST OUT" page and "TEST OUT" item on the "LEVEL 6/9", "LEVEL 7/9" and "D/A GAIN" pages.
* LEVEL 6/9 WHT R_H SAW : 0 WHT R_V SAW : 0 WHT G_H SAW : 0 WHT G_V SAW : 0 WHT B_H SAW : 0 WHT B_V SAW : 0 TEST OUT : ENC	Sets the manual white shading sawtooth correction amount of R/G/B and H/V independently Set the type of the video signal output from the TEST OUT connector. ENC : Outputs a VBS signal to the TEST OUT connector. R : Outputs an Rch signal to the TEST OUT connector. G : Outputs a Gch signal to the TEST OUT connector. B : Outputs a Bch signal to the TEST OUT connector. R-G : Outputs an R-G signal to the TEST OUT connector. B-G : Outputs a B-G signal to the TEST OUT connector.
* LEVEL 7/9 BLK R_H SAW : 0 BLK R_V SAW : 0 BLK G_H SAW : 0 BLK G_V SAW : 0 BLK B_H SAW : 0 BLK B_V SAW : 0 TEST OUT : ENC	Sets the manual black shading sawtooth correction amount of R/G/B and H/V independently. Set the type of the video signal output from the TEST OUT connector. ENC : Outputs a VBS signal to the TEST OUT connector. R : Outputs an Rch signal to the TEST OUT connector. G : Outputs a Gch signal to the TEST OUT connector. B : Outputs a Bch signal to the TEST OUT connector. R-G : Outputs an R-G signal to the TEST OUT connector. B-G : Outputs a B-G signal to the TEST OUT connector.

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VIEWFINDER SCREEN (Factory setting)	DESCRIPTION
* LEVEL 8/9	
MATRIX TABLE : A	Selects the matrix circuit. At the factory shipping, the same matrix is assigned for both A and B. The matrix coefficient can be freely changed to obtain a customers' desired color reproducibility.
MATRIX R-G : 0 MATRIX R-B : 0 MATRIX G-R : 0 MATRIX G-B : 0 MATRIX B-R : 0 MATRIX B-G : 0	Sets the matrix coefficient.
* LEVEL 9/9	
H PHASE : 55	Sets the H phase of the camera in the external genlock mode.
SC PHASE FINE : 0 COARSE : 0	Sets the SC phase of the camera in the external genlock mode. A fine adjustment is performed using the "SC PHASE FINE" item, and a coarse adjustment using the "SC PHASE COARSE" item.
SC-H : 0	Sets the INT SC phase reference level.
IRIS SET : 0	Sets the auto iris reference level.
IRIS MODE : 0	Sets the auto iris control level. The more this set value increases, it approaches the average. The less this set value decreases, it approaches the peak. Monitor the level bar at the upper right on the viewfinder screen for this setting item to check that it approaches the peak level or average level. The "P" indication on the left of the level bar means the peak level. The "A" indication on the right of the level bar means the average level.
* OTHERS *	
BATT WARNING : 10%	Sets the blinking (alarm) start to the remaining level when the battery of ANTON/BAUER inc. is used. 10% : Blinks on the viewfinder screen when the voltage of the battery remaining information is approximately 0.67 V. 20% : The 20% display means that the voltage of the battery remaining information is approximately 1.33V. Blinks on the viewfinder screen when the voltage of the battery remaining information is approximately 1.0 V.
TIME CODE DISP : OFF	Sets whether to output the time code to the TEST OUT connector and viewfinder screen. (Outputs the character on the viewfinder screen and time code at the same time to the TEST OUT connector.) ON : Outputs the time code during normal operation. PB : Outputs the time code during playback only. OFF : Outputs no time code.
* D/A GAIN	
ENC GAIN : 0	Used for the ENC gain adjustment.
TEST RGB GAIN : 0	Used for the test R/G/B gain adjustment. Sets the level of the R/G/B signal output to the TEST OUT connector.
TEST OUT : ENC	Sets the type of the video signal output from the TEST OUT connector. ENC : Outputs a VBS signal to the TEST OUT connector. R : Outputs an Rch signal to the TEST OUT connector. G : Outputs a Gch signal to the TEST OUT connector. B : Outputs a Bch signal to the TEST OUT connector. R-G : Outputs an R-G signal to the TEST OUT connector. B-G : Outputs a B-G signal to the TEST OUT connector.

VIEWFINDER SCREEN (Factory setting)	DESCRIPTION
* MENU SELECT 1/3 * *MARKER 1/2 MARKER 2/2 *VF DISPLAY *MASTER GAIN *CAMERA ID SHUTTER *CLEAR SCAN ! LED *SETUP CARD	Sets whether to display the pages on the left in the USER mode.
* MENU SELECT 2/3 * FUNCTION 1/2 FUNCTION 2/2 *TEST OUT *WIDE SCREEN ----------	Sets whether to display the pages on the left in the USER mode. (DVW-700WS/WSP only)
* MENU SELECT 3/3 * LEVEL 1/9 LEVEL 2/9 LEVEL 3/9 LEVEL 4/9 LEVEL 5/9 LEVEL 6/9 LEVEL 7/9 LEVEL 8/9 LEVEL 9/9 OTHERS	Sets whether to display the pages on the left in the USER mode.
* AUTO SHADING * BLACK ---------- WHITE ----------	 Corrects the black shading automatically. Corrects the white shading automatically.
* DCC ADJUSTMENT * D RANGE : 4 ---------- POINT : 0 ---------- GAIN : 0 ----------	 Sets the dynamic range during dynamic contrast control. (0: approximately 300%, 6: approximately 600%) Sets the knee point during dynamic contrast control. Sets the knee slope value during dynamic contrast control.
* OPERATION MODE * R-G/B-G SEL. : OFF ---------- ZEBRA : OFF ---------- GAMMA TABLE : A ----------	 Sets whether to add the R-G and B-G items to the "TEST OUT" page and the "TEST OUT" item (on "LEVEL 5/9" and "D/A GAIN" pages). Sets this item when a VF without the zebra switch is used. A zebra pattern is forcibly displayed on the viewfinder screen regardless of the VF zebra switch setting when this item is set to ON. Selects the characteristics of the gamma correction. More distinct black gradation is obtained when this item is set to B. Normally setting to A. A : Sony standard gamma curve B : High gain gamma curve C : Gamma curve bettween A-curve and B-curve

VIEWFINDER SCREEN (Factory setting)	DESCRIPTION
* SG ADJUSTMENT *	
H BLKG WIDTH : 17 (for NTSC) 18 (for PAL)	Sets the H blanking width. (17: 10.9 µs for NTSC, 18: 12.0 µs for PAL)
V BLKG : 20H (for NTSC only)	Selects the V blanking width. (19H, 20H, or 21H)
* MEASUREMENT MODE *	Automatically makes various settings required to measure the following specifications (when this item is set to OFF.)
S/N : OFF	S/N — DETAIL : OFF; APERTURE : OFF; CHROMA : OFF; GAMMA : OFF; MATRIX : OFF; FLARE : OFF
MODULATION : OFF	MODULATION — DETAIL : OFF; APERTURE : OFF; GAMMA : OFF; MATRIX : OFF; FLARE : OFF
RESOLUTION : OFF	RESOLUTION — MATRIX : OFF
SENSITIVITY : OFF	SENSITIVITY — KNEE : OFF; WHITE CLIP : OFF
*** DATA RESET ***	Resets the set value or adjustment value in each mode.
USER	Resets the data set in the USER mode.
ENGINEER	Resets the data set in the USER and ENG modes. The factory-setting value is returned during ENGINEER resetting. **NOTE** The adjustment data of the white balance and black balance is cleared in each reset mode. The TEST OUT output is set to ENC. The TEST SAW is canceled and the camera picture is output.
* LED SELECT *	Assigns G-TALLY, REC, NON STD, RET (spare lamp in red), and SAVE signals to the LEDs on the viewfinder screen. **NOTE** It is recommended to set the "UPPER" item to REC because the LED of the "UPPER" item and the tally lamp are interlocked.
UPPER LEFT : G-TALLY UPPER : REC LOWER LEFT : NON STD LOWER : RET LOWER RIGHT : SAVE	

SETUP MENU CHECK SHEET

NOTE **USER MODE** : Basically rewrites the RAM data in the USER mode by setting of each item.
ENG MODE : Basically rewrites the EEPROM data in the ENGINEERING mode by setting of each item. However, opens the item common to the USER mode and rewrites the RAM data sometimes.

〈**CANCEL**〉 Yes or No is displayed to indicate whether the value set by the UP/DOWN button can be canceled using the CANCEL/PRST switch.
〈**PREST**〉 Yes or No is displayed to indicate whether the factory-setting value can be returned using the CANCEL/PRST switch.
〈**DATA**〉

DATA AREA : Indicates the area in which data is written when it is set in each item.
U··User mode, E··ENG mode
(The data set in a RAM is stored for approximately one week.)
USER RESET: The data set in a RAM is reset when the USER RESET item on the DATA RESET page is executed.
F ... Returns to the factory-setting value for the item that is written in a RAM in the USER/ENG mode.
E ... Returns to the value set in the ENG mode for the item that is written in a RAM in the USER mode and that is written in an EEPROM in the ENG mode.
No... Cannot be reset.

NOTE ENG RESET: The data set in a RAM and EEPROM is reset (the factory setting value is returned) when the ENG RESET item on the DATA RESET page is executed.

〈**SETUP CARD STORE**〉 Yes or No is displayed to indicate whether data can be written in the setup card.
〈**RM**〉 M, P, or No is displayed to indicate whether this item can be operated when remote control unit RM-P9 is connected.
M(MENU) : Can be operated at the bottom of the RM-P9.
P(PANEL) : Can be operated in the front of the RM-P9.
No : Cannot be operated by the RM-P9.
〈**FACTORY SETTING**〉 Sets the factory-setting value.
〈**CUSTOMER'S SETTING**〉 Enter the setting state of the customer.

PAGE	ITEM	CAN-CEL	PRE-SET	DATA AREA	DATA USER RESET	SETUP CARD STORE	RM	FACTORY SETTING	CUS-TOMER'S SETTING
MARKER 1/2	SAFETY ZONE	No	No	U/E; RAM	F	Yes	M	ON	
	SAFETY AREA							90%	
	CENTER							ON	
	CENTER H	Yes	Yes						
	CENTER V								
MARKER 2/2	BOX CURSOR	No	No	U/E; RAM	F	Yes	M	OFF	
	BOX WIDTH	Yes	Yes						
	BOX HEIGHT								
	BOX H								
	BOX V								
VF DISPLAY	DISP MODE	No	No	U/E; RAM	F	Yes	M	3	
	EXTENDER							ON	
	ZOOM							ON	
	FILTER							ON	
	WHITE							ON	
	GAIN							ON	
	SHUTTER							ON	
	TAPE							ON	
	IRIS							ON	
	CAMERA ID							ON	
MASTER GAIN	LOW	No	Yes	U/E; RAM	F	Yes	M	0dB	
	MID							9dB	
	HIGH							18dB	
CAMERA ID	ID : □□□□□□□□□□	No	Yes	U/E; RAM	F	Yes	M	ALL "□"	
SHUTTER SPEED ※ 1	CLS	No	No	U/E; RAM	F	Yes	P	*(YES)	
	EVS							*(YES)	
	1/100 (for NTSC), 1/60 (for PAL)							*(YES)	
	1/125							*(YES)	
	1/250							*(YES)	
	1/500							*(YES)	
	1/1000							*(YES)	
	1/2000							*(YES)	

※ 1:This page doesnot appear when remote control unit RM-P9 is connected.

PAGE	ITEM	CAN-CEL	PRE-SET	DATA AREA	DATA USER RESET	SETUP CARD STORE	RM	FACTORY SETTING	CUS-TOMER'S SETTING
CLEAR SCAN	**.*Hz 60.1Hz (for NTSC),50.2Hz (for PAL)	No	Yes	U/E; RAM	F	Yes	M	60.1 /50.2	
'!' LED	GAIN	Yes	No	U/E; RAM	F	Yes	M	*(YES)	
	SHUTTER							*(YES)	
	WHITE PRESET							• (NO)	
	EXTENDER							*(YES)	
	FILTER							• (NO)	
	A. IRIS OVERRIDE							• (NO)	
SETUP CARD	READ (→CAM)	—	—	—	—	—	M		
	WRITE (→CARD)								
	WRITE PROTECT							(OFF)	
	ID EDIT								
FUNCTION 1/2	DETAIL	No	No	U;RAM E;EEP	E	Yes	P	ON	
	SKIN TONE DTL						M	OFF	
	APERTURE							ON	
	MATRIX						No	ON(for PAL) OFF(for NTSC)	
	GAMMA							ON	
	CHROMA							ON	
	TEST SAW						P	OFF	
	CROSS COLOR FLT (for NTSC)						M	OFF	
	SNG BARS (for J only)							OFF	
FUNCTION 2/2	GENLOCK	No	No	U;RAM E;EEP	E	Yes	M	ON	
	CAM RET.							OFF	
	FILTER INH.						No	OFF	
	FIELD/FRAME						M	FLD	
	A. IRIS OVERRIDE						P	OFF	
TEST OUT	ENC	No	Yes	—	F	—	M	ENC	
	R								
	G								
	B								
	R-G								
	B-G								
WIDE SCREEN (DVW-700WS only)	16:9/4:3 MODE	No	No	U;RAM E;EEP	E	Yes	M	16:9	
	VF ASPECT							AUTO	
	BOX/4:3 LIMITS							BOX	
	"16:9" BARS ID							OFF	
	"16:9" VF ID							OFF	
LEVEL 1/9 ※ 4	DETAIL LEVEL	Yes	Yes	U;RAM E;EEP	E	Yes	P	0	
	V DTL LEVEL					※ **5**	M	0	
	H DTL FREQ.							0	
	V DTL BLK CLIP							0	
	DTL WHT CLIP							0	
	DTL BLK CLIP							0	
	CRISPENING							0	
	LEVEL DEPEND.							0	
	KNEE APERTURE							0	
	APERTURE LEVEL							0	
LEVEL 2/9	SKIN TONE HUE	Yes	Yes	U;RAM E;EEP	E	Yes	M	119	
	SKIN TONE DTL							0	
	SAT. CENTER (S)							0	
	HUE. CENTER (H)							0	
	SAT. RANGE (dS)							0	
	HUE. RANGE (dH)							0	
	SKIN TONE IND	No	No					OFF	
	SKIN TONE DTL							OFF	

※ 4 : Sets the aspect ratio to 16:9 and 4:3 respectively for this page adjustment. (DVW-700WS/WSP only)

※ 5 : The setting of DVW-700 is associated with the setting in the 16:9 mode of DVW-700WS/WSP. (ex:Read the setting data in the 16:9 mode of DVW-700WS/WSP when uses the setup card of DVW-700WS/WSP for DVW-700/P.)

PAGE	ITEM	CAN-CEL	PRE-SET	DATA		SETUP CARD STORE	RM	FACTORY SETTING	CUS-TOMER'S SETTING
				AREA	USER RESET				
LEVEL 3/9	MASTER BLACK	Yes	Yes	U;RAM E;EEP	E	Yes	P	0	
	MASTER GAMMA							0	
	KNEE	No	No				No	ON	
	KNEE POINT	Yes	Yes				P	0	
	KNEE SLOPE						No	0	
	WHITE CLIP	No	No				M	ON	
	WHT CLIP LEVEL	Yes	Yes					0	
	ZEBRA1 DETECT							67	
	ZEBRA2	No	No					OFF	
	ZEBRA2 DETECT	Yes	Yes					100	
LEVEL 4/9	I (for NTSC) / R-Y(for PAL)BURST LEVEL	Yes	Yes	U;RAM E;EEP	E	Yes	M	0	
	Q (for NTSC) / B-Y(for PAL)BURST LEVEL							0	
	I (for NTSC) / R-Y(for PAL) CHROMA LEVEL							0	
	Q (for NTSC) / B-Y(for PAL) CHROMA LEVEL							0	
	I (for NTSC) / R-Y(for PAL)	No	No					ON	
	Q (for NTSC) / B-Y(for PAL)							ON	
	ENC Y LEVEL	Yes	Yes					0	
	ENC SETUP LEVEL (for NTSC only)							0	
LEVEL 5/9 ※ 1	R BLACK	Yes	Yes	U;RAM E;EEP	E	Yes	P		
	G BLACK						No		
	B BLACK						P		
	R FLARE						No		
	G FLARE								
	B FLARE								
	R GAMMA								
	G GAMMA								
	B GAMMA								
	TEST OUT	No		—	F	No		ENC	
LEVEL 6/9	WHT R-H SAW	Yes	Yes	U/E;EEP	No	Yes	M		
	WHT R-V SAW								
	WHT G-H SAW								
	WHT G-V SAW								
	WHT B-H SAW								
	WHT B-V SAW								
	TEST OUT	No		—	F	No		ENC	
LEVEL 7/9	BLK R-H SAW	Yes	Yes	U/E;EEP	No	Yes	M		
	BLK R-V SAW								
	BLK G-H SAW								
	BLK G-V SAW								
	BLK B-H SAW								
	BLK B-V SAW								
	TEST OUT	No		—	F	No		ENC	
LEVEL 8/9	MATRIX TABLE	No	No	U;RAM E;EEP	E	Yes	M	A	
	MATRIX R-G	Yes	Yes					0	
	MATRIX R-B							0	
	MATRIX G-R							0	
	MATRIX G-B							0	
	MATRIX B-R							0	
	MATRIX B-G							0	
LEVEL 9/9	H PHASE	Yes	Yes	U/E;EEP	No	Yes	M	55	
	SC PHASE FINE							0	
	COARSE							0	
	SC-H							0	
	IRIS SET						P	0	
	IRIS MODE						M	0	
OTHERS	BATT WARNING	No	No	U;RAM E;EEP	E	Yes	M	10%	
	TIME CODE DISP							OFF	
D/A GAIN	ENC GAIN	Yes	Yes	E;EEP	No	No	M	0	
	TEST RGB GAIN							0	
	TEST OUT	No		—	F			ENC	

※ 1:This page does not appear when remote control unit RM-P9 is connected.

PAGE	ITEM	CAN-CEL	PRE-SET	DATA AREA	DATA USER RESET	SETUP CARD STORE	RM	FACTORY SETTING	CUS-TOMER'S SETTING
MENU SELECT 1/3	MARKER 1/2	No	Yes	E;EEP	No	Yes	M	* (YES)	
	MARKER 2/2							• (NO)	
	VF DISPLAY							* (YES)	
	MASTER GAIN							* (YES)	
	CAMERA ID							* (YES)	
	SHUTTER							• (NO)	
	CLEAR SCAN							* (YES)	
	! LED							• (NO)	
	SETUP CARD							* (YES)	
MENU SELECT 2/3	FUNCTION 1/2	No	Yes	E;EEP	No	Yes	M	• (NO)	
	FUNCTION 2/2							• (NO)	
	TEST OUT							* (YES)	
	WIDE SCREEN (DVW-700WS/WSP only)							* (YES)	
MENU SELECT 3/3	LEVEL 1/9	No	Yes	E;EEP	No	Yes	M	• (NO)	
	LEVEL 2/9							• (NO)	
	LEVEL 3/9							• (NO)	
	LEVEL 4/9							• (NO)	
	LEVEL 5/9							• (NO)	
	LEVEL 6/9							• (NO)	
	LEVEL 7/9							• (NO)	
	LEVEL 8/9							• (NO)	
	LEVEL 9/9							• (NO)	
	OTHERS							• (NO)	
AUTO SHADING	BLACK	—	—	—	—	—	No		
	WHITE								
DCC ADJUSTMENT	D RANGE	Yes	Yes	E;EEP	No	Yes ※ **6**	No	4 (500%)	
	POINT							0	
	GAIN							0	
OPERATION MODE	R-G/B-G SEL.	No	No	E;EEP	No	Yes ※ **7**	M	OFF	
	ZEBRA							OFF	
	GAMMA TABLE		Yes					A	
SG ADJUSTMENT	H BLKG WIDTH	Yes	Yes	E;EEP	No	Yes ※ **7**	M	17(for NTSC) 18(for PAL)	
	V BLKG (for NTSC only)							20H	
MEASUREMENT MODE	S/N	—	—	—	—	—	No	OFF	
	MODULATION							OFF	
	RESOLUTION							OFF	
	SENSITIVITY							OFF	
DATA RESET	USER	—	—	—	—	—	No		
	ENGINEER								
LED SELECT	UPPER LEFT	No	No	E;EEP	No	Yes	M	G-TALLY	
	UPPER							REC	
	LOWER LEFT							NON STD	
	LOWER							RET	
	LOWER RIGHT							SAVE	

※ 6 : ROM Version (IC16/AT-84 board) : V2.01 and higher
※ 7 : ROM Version (IC16/AT-84 board) : V2.00 and higher

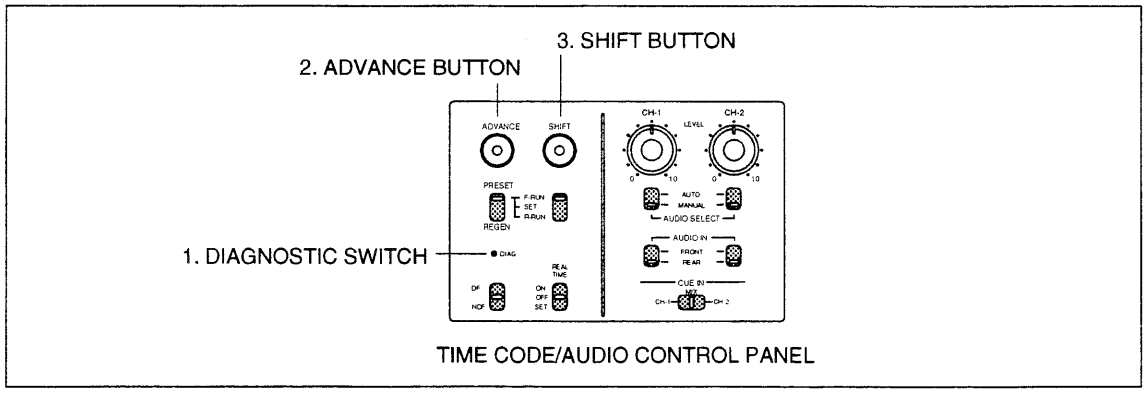
3-2. DIAGNOSTIC MODE

The DVW-700/700P has the DIAGNOSTIC mode used for the maintenance menu setting and self-diagnostics of the VTR.

CAUTION

- When the tape transport is in the stop mode, enter the DIAGNOSTIC mode.
- Do not press the DIAGNOSTIC switch when the unit is connected to remote control unit RM-P9. Pressing the DIAGNOSTIC switch with the RM-P9 connected will disturb both the self-diagnostics and remote control functions.

SWITCH AND BUTTONS



TIME CODE/AUDIO CONTROL PANEL

1. **DIAGNOSTIC switch**
   Press to enter and exit the DIAGNOSTIC mode.

2. **ADVANCE button**

3. **SHIFT button**

OPERATION

1. Press the DIAGNOSTIC switch on the side panel with a clip lead or similar object. The DIAGNOSTIC mode is then displayed on the viewfinder screen.
2. To shift the menu, press the ADVANCE button on the side panel.
   (The menu is shifted one step at a time.)
3. To execute the menu, press the SHIFT button on the side panel.
   For details, refer to each menu in the following tables.
4. To exit the DIAGNOSTIC mode, press the DIAGNOSTIC switch again.

MODE		DESCRIPTION
LCD SCREEN	VF SCREEN	
01 : XXXH 02 : XXXH 03 : XXXH 04 : XXX 05 : XXXH 06 : XXXH 07 : XXXH 08 : XXX	–SELF DIAG. START– ↓ After two seconds VTR MENU-1 HOURS METER 1. DRUM RUNNING ___XXXH 2. TAPE RUNNING ___XXXH 3. OPERATION ___XXXH 4. THREADING ___XXX 5. DRUM RUN-2 ___XXXH 6. TAPE RUN-2 ___XXXH 7. OPERATION-2 ___XXXH 8. THREADING-2 ___XXX	The contents of the following are displayed. 1. Drum running meter 2. Tape running meter 3. Operation meter 4. Threading counter 5. Drum running meter (Can be reset by the consumer.) 6. Tape running meter (Can be reset by the consumer.) 7. Operation meter (Can be reset by the consumer.) 8. Threading counter (Can be reset by the consumer.) It is recommended to perform the periodic checks and maintenance based on the hours meter. (Refer to Section 6-3-1. Hours Meter.)
BATTERY VOLTAGE 1 : 11.3V ↓ After setting 1-0 XX.XV or 1-E XXXV 2 : XX.XV ↓ After setting 2-0 XX.XV or 2-E XX.XV VITC INSERT LINE 3 : XXXX First line Next line ↓ After setting 3-0 XXXX or 3-E XXXX	VTR MENU-2 BATTERY VOLTAGE 1. BEFORE END 11.3 V 2. END 11.0 V VITC INSERT LINE 1. 16LINE 2. 18LINE	BATTERY VOLTAGE Displays and sets the voltage of battery before end and battery end. (Refer to the Operation Manual for the setting.) 1. Battery before end voltage setting 11.0 V to 13.0 V (in 0.1 V steps) Setting OK 1-0 XXX Setting NG 1-E XXX 2. Battery end voltage setting 10.5 V to 11.5 V (in 0.1 V steps) Setting OK 2-0 XXX Setting NG 2-E XXX VITC INSERT LINE Displays and sets the VITC insert line. 12 to 19 lines (for NTSC) 9 to 22 lines (for PAL) VITC insert line setting 1. Press the SHIFT button. The first line on the LCD display then blinks. 2. Press the ADVANCE button to select the first line. The lines that can be selected are 12 to 19 (for NTSC), or 9 to 22 (for PAL). After 19 lines (for NTSC) or 22 lines (for PAL), 12 (for NTSC) or 9 (for PAL) lines are returned. 3. Press the SHIFT button. The next line then blinks. Like the first line, press the ADVANCE button to select the next line. 4. Press the SHIFT button. The insert line is then written in the EEPROM. Setting OK 3-0 XXXX Setting NG 3-E XXXX

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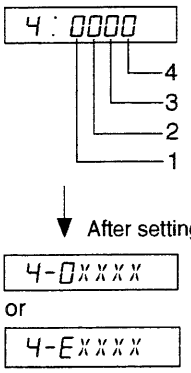
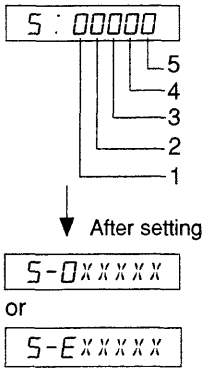
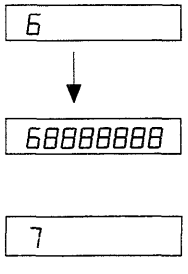
MODE		DESCRIPTION
LCD SCREEN	VF SCREEN	
	VTR MENU-3 VTR MODE SELECT-1 1. VIDEO/AUDIO OUT AUTO 2. VIDEO OUT (F/R) EE 3. TC OUT AUTO 4. REC TALLY BLINK ON	1. Outputs video and audio signals. 0(AUTO): Outputs the PB(playback) and EE signals. 1(EE) : Outputs only the EE signal. 2. Outputs a video signal in the FF/REW mode (Enabled when the "VIDEO/AUDIO OUT" item on the "VTR MENU-3" menu is set to AUTO.) 0(EE) : Outputs only the EE picture. 1(F/R) : Outputs the FF and REW pictures. **NOTE** No FF and REW pictures may be output for reasons of temperature, tape condition and so on. 3. Outputs a TC signal. 0(AUTO): Outputs the TCG/PB signal. 1(GENE): Outputs the TCG signal. 4. Sets whether to turn on and off the TALLY indicator in case of the battery before end and the tape before end. 0(ON): Lights. 1(OFF): Not light. Setting 1. Press the SHIFT button to turn on the first item. To select the desired item, press the SHIFT button. (The cursor that indicates the selected item moves to the next item every time the SHIFT button is pressed.) 2. Press the ADVANCE button to set the item. 3. After the setting of the "REC TALLY BLINK" item is completed, press the SHIFT button. All the items in this mode are written in EEPROM. Setting OK 4-0xxxxx Setting NG 4-Exxxxx

MODE		DESCRIPTION
LCD SCREEN	VF SCREEN	
	VTR MENU-4 VTR MODE SELECT-2 1. AUDIO OUT (F/R) CUE 2. AUDIO OUT (CH) CH1/2 3. AU-REC CH3/CH4 ON 4. AU-REC 1 kHz OFF 5. AU-EMPHASIS OFF	1. Outputs an audio signal in the FF/REW mode. (Enabled when the "VIDEO/AUDIO OUT" item on the "VTR MENU-3" menu is set to AUTO and the "VIDEO OUT (F/R)" item on the "VTR MENU-3" menu is set to F/R.) 0: EE sound 1: Cue sound 2. Sets whether to output a CH1/2 or CH3/4 signal to the AUDIO output terminal in the PB mode. 0: CH1/2 1: CH3/4 3. Sets whether to record the audio signal in CH1/2 to CH3/4. 0: ON 1: OFF 4. Sets whether to record the 1-kHz test signal of an internal signal generator when a color-bar signal is selected. 0(OFF): Not recorded. 1(–20 dB): Recorded –20 dB in 1kHz. 2(–20 dB): Recorded –20 dB in 1kHz. 5. Sets the audio emphasis to ON or OFF. 0: ON 1: OFF Setting 1. Press the SHIFT button to turn on the first item. To select the desired item, press the SHIFT button. (The cursor that indicates the selected item moves to the next item every time the SHIFT button is pressed.) 2. Press the ADVANCE button to set the item. 3. After the setting of the "AU-EMPHASIS" item is completed, press the SHIFT button. All the items in this mode are written in EEPROM. Setting OK 5-0xxxxx Setting NG 5-Exxxxx
	VTR MENU-5 LCD CHECK ALL OFF ↕ LCD CHECK ALL ON LAMP CHECK ALL OFF ↕ LAMP CHECK ALL ON	LCD CHECK Checks that all the characters are turned on or off on the LCD display. All the characters are turned on or off every time the SHIFT button is pressed. LAMP CHECK Checks that the following lamps are all turned on or off. • REW button indicator • F FWD button indicator • PLAY button indicator • WARNING indicator • Tally indicator • Cameraman tally indicator • Back tally indicator • Spare indicator (green) (on the viewfinder screen) • REC indicator (on the viewfinder screen) • BATT indicator (on the viewfinder screen) • ⓘ indicator (on the viewfinder screen) • Spare indicator (red) (on the viewfinder screen) • VTR SAVE indicator (on the viewfinder screen) All the lamps are turned on or off every time the SHIFT button is pressed.

MODE		DESCRIPTION
LCD SCREEN	VF SCREEN	
8	VTR MENU-6 VTR STATUS-1 NTSC/PAL NTSC SCI_SV OK CURRENT MODE PLAY LAST MODE STOP CAM POSITION LOAD CAPSTAN STOP DRUM ROTATE	NTSC/PAL Displays whether the system is NTSC or PAL. SCI-SV Displays the serial communication status between the system control and servo systems. If a fault occurs, "NG" is displayed. CURRENT MODE Displays the current VTR mode. • Display list UNTHREAD STOP PLAY FF REW THREAD REC R. PAUSE R.REVIEW LAST MODE Displays the last VTR mode. • Display list UNTHREAD STOP PLAY FF REW THREAD REC R. PAUSE R. REVIEW CAM POSITION Displays the cam gear position of a mechanical sensor. • Display list B0 EJECT B1 STBY B2 LOAD B3 STOP B4 RUN B5 CLEAN B6 CAPSTAN Displays the capstan motor status. • Display list ROTATE STOP LOCK DRUM Displays the drum status. • Display list ROTATE STOP LOCK

<table>
<tr><th colspan="2">MODE</th><th rowspan="2">DESCRIPTION</th></tr>
<tr><th>LCD SCREEN</th><th>VF SCREEN</th></tr>
<tr><td>9</td><td>VTR MENU-7

VTR STATUS-2
TAPE TOP DET
TAPE END DET
HUMID DET
CASSETE SW
CASSETTE IN OUT
REC INHI. ON
ID 1 1 1 1
4
3
2
1</td><td>TAPE TOP
Displays the status of a TAPE TOP sensor. When the tape top is detected, “DET(DETECT)” is displayed.
TAPE END
Displays the status of a TAPE END sensor. When the tape end is detected, “DET(DETECT)” is displayed.
HUMID
Displays the status of a HUMID sensor. When the humidity is detected, “DET(DETECT)” is displayed.
CASSETTE SW
Displays the cassette status.
CASSETTE IN
Displays the existence of a cassette.
REC INHI.
Turns on and off the REC INHIBIT function.
ID
1. ID hole 3: Detects the reel hub diameter.
0: Small hub 1: Large hub
2. ID hole 2: Detects the tape thickness.
0: —— 1: 14um
3. ID hole 4: Extra ID
0: Open 1: Closed
4. ID hole 5: Extra ID
0: Open 1: Closed</td></tr>
<tr><td>A</td><td>* DEVICE STATUS *
I/O EEPROM DP
1 SW1 :OK 3 CN :OK 4 DET :OK
SW2 :OK TG1 :OK SHD :OK
DR :OK TG2 :OK PR :OK
TG :OK VA :OK ENC :OK
DA :OK SG :OK
2 IF :OK SH :OK RCV :OK
VTR :OK AT :OK RAM :OK
PUSH AWB SW.
↕
* DP DIAG STATUS *
PULSE DET→PR PR→EN
5 DET :OK 6 R2H :OK 7 DH :OK
SHD :OK R1H :OK DL :OK
PR :OK R0H :OK Y :OK
ENC :OK G2H :OK R-Y :OK
SG :OK G1H :OK B-Y :OK
RCV :OK G0H :OK VF :OK
WS :OK B0H :OK
PR→RCV
PUSH AWB. SW. 8 Y:OK</td><td>DEVICE STATUS
Checks the communication function for each device.
1. I/O check
SW1: IC101/AIF-5 DR: IC13/DR-195
SW2: IC503/TC-75 TG: IC2/TG-118
In case of “NG”, confirm that the cable is not disconnected between boards.
2. Communication status with AT microcomputer
IF: IC5/IF-443 VTR: IC1/SY-191
In case of “NG”, confirm that the AT-84, IF-443, and SY-191 boards are not removed.
3. EEPROM check
CN: IC102/AIF-5 DA: IC4/DA-76A
TG1: IC24/TG-118 SH: IC8/SH-47
TG2: IC5/TG-118 AT: IC18/AT-84
VA: IC11/VA-144
In case of “NG”, confirm that the cable is not disconnected between boards. If not, the EEPROM is considered to be defective.
4. LSI check
DET: IC1/SH-47 SG: IC7/PE-29
SHD: IC2/SH-47 RCV: IC7/DA-76A
PR: IC5/PE-29 RAM: IC7/SH-47
ENC: IC6/PE-29
In case of “NG”, the LSI is considered to be defective.

Continued to next page.</td></tr>
</table>

MODE		DESCRIPTION
LCD SCREEN	VF SCREEN	
		Continued from previous page. DP DIAG STATUS Checks the pulse and connection for each device. 5. Checks that basic pulses (HD and VD and so on) are normally input to each device in step 4. In case of "NG", the device is considered to be defective or disconnected. (WS : DVW-700WS/WSP only) 6. Checks the connection between DET (IC1 on the SH-47 board) and PR (IC5 on the PE-29 board). R2H: RCH, 2H-delayed signal R1H: RCH, 1H-delayed signal R0H: RCH, non-delayed signal G2H: GCH, 2H-delayed signal G1H: GCH, 1H-delayed signal G0H: GCH, non-delayed signal B0H: BCH, non-delayed signal In case of "NG", confirm that the CN-1019 board is not disconnected. 7. Checks the connection between PR (IC5 on the PE-29 board) and EN (IC6 on the PE-29 board). DH: Detail signal DL: Detail signal Y: Y signal R-Y: R-Y signal B-Y: B-Y signal VF: VF signal In case of "NG", confirm that the CN-1020 board is not disconnected. 8. Checks the connection between PR (IC5 on the PE-29 board) and RCV (IC7 on the DA-76A board). Y: Y signal In case of "NG", confirm that the CN-1020 board is not disconnected. Camera system Self-diagnosis Press the SHIFT button so that MODE "A" is displayed on the LCD screen. (The camera system self-diagnosis menu is alternately selected when the AUTO W/B BAL switch is set to WHT.) Confirm that all the items are "OK".

MODE		DESCEIPTION
LCD SCREEN	VF SCREEN	
b	VTR MENU-9 SERVO ADJUST DATA 1. CAP FREE SP XX 2. PG PHASE-1 XX 3. PG PHASE-2 XX 4. CFGA DUTY XX 5. CFGB DUTY XX 6. EDIT DELAY XX 7. SLACK XXXX XXXX XXXX XXXX	1. Displays the capstan free speed adjustment data. 2. Displays the low-order bit of drum PG phase adjustment data. 3. Displays the high-order bit of drum PG phase adjustment data. If it is "00" in hexadecimal, the PG phase adjustment data (low-order bit) ranges from 0 to 255. If it is "FF", the PG phase adjustment data ranges from 256 to 511. 4. Displays the capstan FGA offset adjustment data. 5. Displays the capstan FGB offset adjustment data. 6. Displays the delay adjustment data during back-space editing. 7. Slack • Display item XX XX XX XX XX XX XX XX ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ① Slack trouble code 1 ② Slack state code 1 ③ Slack trouble code 2 ④ Slack state code 2 ⑤ Slack trouble code 3 ⑥ Slack state code 3 ⑦ Slack trouble code 4 ⑧ Slack state code 4 The sequence of the code to be generated is indicated from the right to the left. Items ① and ② are the latest code, and items ⑦ and ⑧ are the oldest code. • Contents of slack trouble code 10: Drum drive voltage abnormality 11: Detects no durm FG 12: Detects no drum PG 20: Capstan drive current abnormality 21: Detects no capstan FG-A 22: Detects no capstan FG-B 23: Capstan rotation abnormality in forward and reverse directions 24: Capstan speed abnormality (High speed) 32: Detects no supply reel FG 42: Detects no take-up reel FG 61: Function cam rotation overtime in forward direction 62: Function cam rotation overtime in reverse direction 63: Tape top sensor overtime 70: Servo NVRAM checksum error 71: Communication error between servo CPUs • Contents of slack state code 00: Power-on initialization 1X: Standby state without cassette 2X: REC 3X: STOP 4X: FF/REW 5X: PB 6X: REC PAUSE 7X: REC REVIEW 8X: Threading and unthreading

MODE		DESCEIPTION
LCD SCREEN	VF SCREEN	
C1 XX C2 XX C3 XX C4 XX C5 XX C6 XX C7 XX C8 XX	REC CURRENT DATA 1. A-CH XX 2. B-CH XX 3. C-CH XX 4. D-CH XX 5. E-CH XX 6. F-CH XX 7. G-CH XX 8. H-CH XX	Displays the REC current data setting.

SECTION 4
BLOCK DIAGRAMS AND CIRCUIT DESCRIPTIONS

CONTENTS OF THIS SECTION

4-1. OVERALL (CAMERA AND VTR)
OVERALL CAMERA BLOCK
Circuit Description of Camera Block
Circuit Description of VTR Block
OVERALL VTR BLOCK

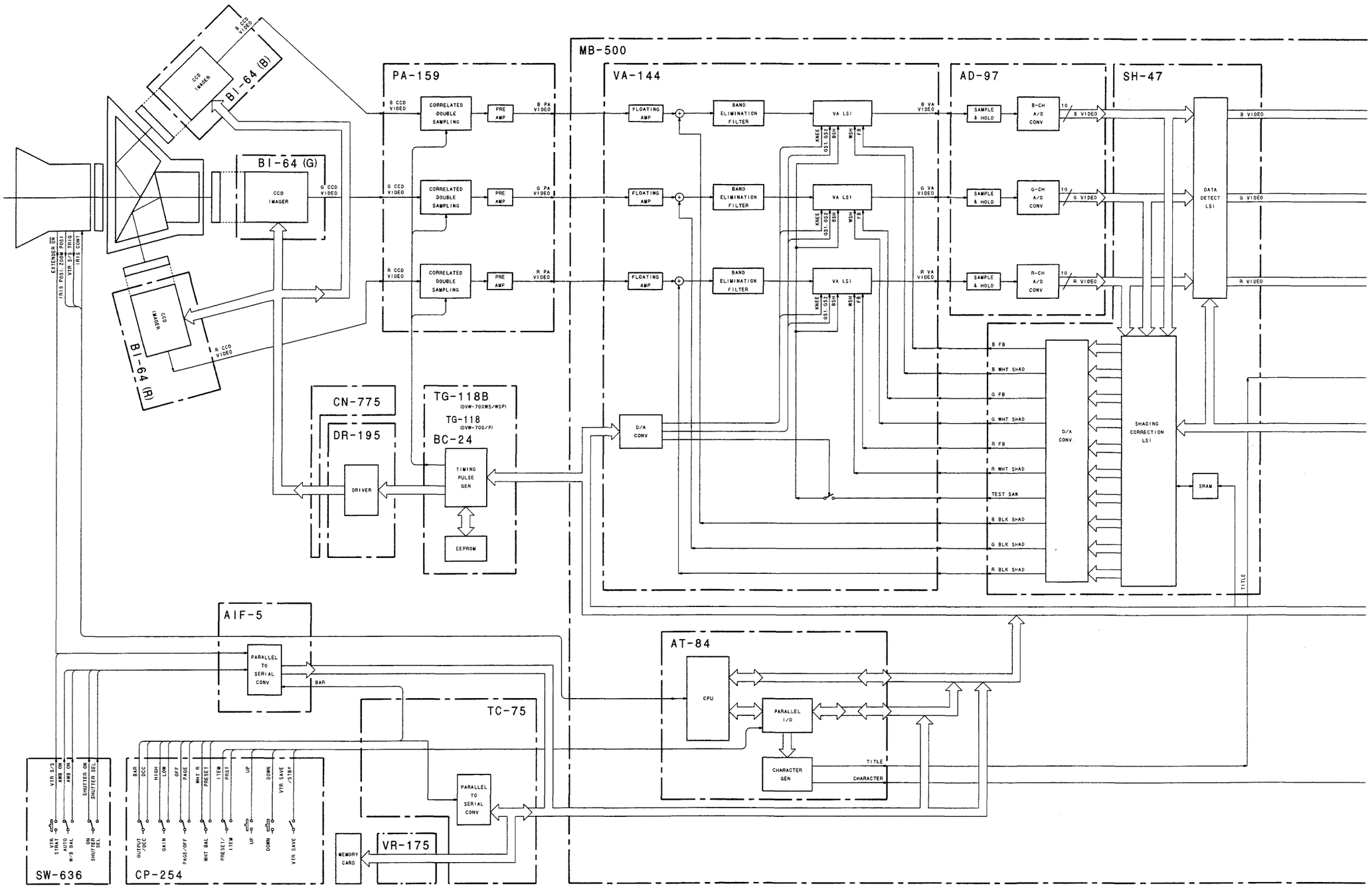
4-2. CIRCUIT BLOCK (CAMERA)
CCD BLOCK : TG-118, DR-195, CN-775, BI-64, PA-159, BC-24
VA-144 BLOCK : VA-144
AD-97 BLOCK : AD-97
DA-76A BLOCK : DA-76A
AT-84 BLOCK : AT-84
IF-443 BLOCK : IF-443
VIEWFINDER BLOCK: VF-56

4-3. CIRCUIT BLOCK (VTR)
RF PROCESSING BLOCK : DRC-3, EQ-48(1), EQ-48(2), Drum ass'y
DIGITAL PROCESSING BLOCK : DEN-1, DDE-1, DBD-1, DAP-1
AUDIO PROCESSING BLOCK : CN-884(1/2), TC-75(1/2), CUE-2, VR-175, MA-62
SYSTEM CONTROL BLOCK : SY-191, TC-75(2/2), KY-293, HN-189(1/2), CN-884(2/2)
SERVO CONTROL BLOCK : SV-148, SE-210, CTL-10, HN-189(2/2)
POWER SUPPLY BLOCK : PS-333, RE-97, RE-98

NOTE
- The above list shows all titles of the block diagrams and circuit descriptions contained in this Section.
- After the title of each circuit block, board names of the circuit boards (except a motherboard, transit board, and subsidiary board) which constitute the circuit block are shown.
- Circuit boards enclosed with [ ] are plug-in boards.

4-1

4-1. OVERALL (CAMERA AND VTR)



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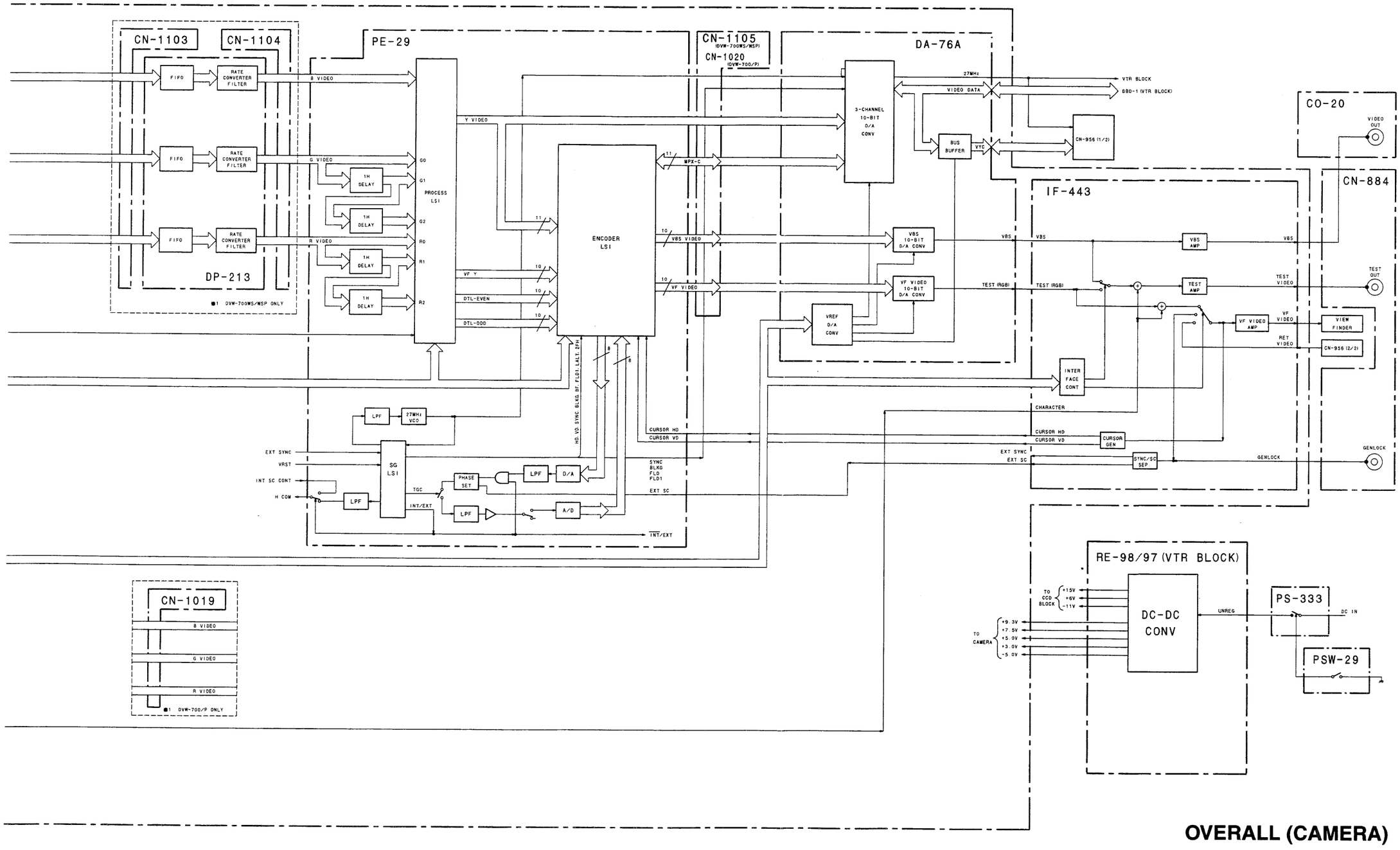
OVERALL (CAMERA) Block Diagram



OVERALL (CAMERA)

OVERALL (CAMERA) Block Diagram

[Circuit Description of Camera Block]

(1) CCD Drive System (TG-118/118P board,DR-195 board,PA-159 board, and BI-64 (R) /64 (G) /64 (B) boards)

• TG-118/118P board

The TG-118 board outputs the pulses for driving the CCD to the DR-195 board and the pulses for sampling the CCD output to the PA-159 board.
The driving pulses are synchronized with the HD and VD pulses input from the PE-29 board and are output.
Pulses are generated from the VCO clock (36 MHz) of the board. The clocks for the digital processing circuit of the main unit (36 MHz, 18 MHz)are also output to the main unit.
CCD V-sub voltage and white shading data,etc.are also stored in the EEP ROM of the TG-118/118P board.

• DR-195 board

The DR-195 board converts the pulses from the TG-118/118P board to directly drive the CCD. The converted pulses are transmitted to the CCD via the BI-64 (R) /64 (G) /64 (B) board. The board also has a circuit which makes +29 V from +15 V for the V-sub voltage. Furthermore, the baord also has an interface circuit for the optical filter.

• BI-64 (R) /BI-64 (G) /BI-64 (B)boards

The CCD is mounted on the BI-64 (R) /BI-64 (G) /BI-64 (B) boards. These boards supply the driving pulses and control voltages to the CCD.
The signals output from the CCD are sent to the PA-159 board via the emitter follower.

• PA-159 board

The PA-159 board extracts video signals from the CCD signals output from the BI-64 (R) /64 (G) /64 (B) boards by correlated double sampling circuit, amplifies them by 1.8 times, and then outputs the resultant to the VA-144 board.

(2) Video Signal System (VA-144 board, AD-97 board, DA-76A board, SH-47 board PE-29 board and DP-213 board)

• VA-144 board

The VA-144 board amplifies the video signals output from the PA-159 board and performs various processings such as black shading correction, gain-up control, blanking cleaning, white shading correction, feedback clamping and white balance adjustment for the signals.
In addition, it also switches video signals and the TEST SAW signal.

• AD-97 board

To convert the analog R, G, B video signals into digital signals,the AD-97 board consists of the sample/hold circuit and A/D converter.
It generates clocks required for the A/D conversion and the digital processing circuit from the clocks of the TG-118/118P board.

• DA-76A board

The DA-76A board converts composite video signals and VF monochrome signals for VF from the digital processing circuit of the PE-29 board into analog.

The DA-76A board converts component video signals in frequency, that is, 18 MHz is converted into 13.5 MHz for Y signal and 9MHz is converted into 6.75 MHz for R-Y and B-Y signals respectively. The resultant signals are multiplied into 27 MHz.

• SH-47 board, PE-29 board

The SH-47 board and PE-29 board add matrix signals and detail signals to analog-to-digital converted R, G and B signals.
It performs the processings such as flare compensation, pedestal control, gamma correction, knee correction and white clipping for the signals.
In addition, it converts these signals to the Y , R-Y, B-Y signals or monochrome signal for VF and outputs them to the DA-76A board. It also performs the following.

- Generates built-in color bar signals and switches them with the main line signals.
- Creates detail and aperture signals from digital R and G signals.
- Creates composite video signals from Y, R-Y and B-Y signals and outputs them to the DA-76A board.
- Generates various synchronous signals, detects a genlock signal, and also detects H ,and a subcarrier phases.
- Detects signals for performing auto iris,flare compensation, DCC, and auto white/black balance.
- Detects black/white shading,generates compensation waveforms for it and outputs them to the VA-144 board.
- Detects black levels and outputs the feedback clamp voltage to the VA-144 board.
- Generates TEST SAW waveforms and output them to the VA-144 board.
- Generates 27 MHz clock signal required for the VTR control.

• DP-213 Board

The DP-213 board converts the digital R, G, B video signals received from the SH-47 board in frequency, that is, 18 MHz is converted into 13.5 MHz. The resultant signals are sampled again by 18 MHz and output. (Only in the 4:3 mode)

(3) Auto System (AT-84 board)

• AT-84 board

The AT-84 board consists mainly of the microcomputer.
It controls the camera section according to the instructions stored in the ROM. It mainly analyzes instructions of the function switches, video system detection data and analog data, and outputs various control signals and compensation signals to the boards. It also outputs status information and self-diagnosis infomation from the character generator as character data. It incorporates the RM-P9 (available separately) interface.

(4) Interface System (IF-443 board)

• IF-443 board

The IF-443 board consists mainly of the VIDEO TEST signal output block,VF signal selection logic and output block, and GENLOCK signal detector.
When outputting, it detects whether each external connector is being conneted or not and turns off the power of unused circuits to save power.

4-4

OVERALL (VTR) Block Diagram

[Circuit Description of VTR Block]

(1) RF Processing Block
(DRC-3 board, EQ-48 boards (1) and (2), and Drum assembly)

The Digital Betacam Camcorder records video and audio signals on the tape using the Digital Betacam format.
In a Digital Betacam studio VTR, one pair of heads with an azimuth angle in the opposite direction to each other record two tracks at a time by turns with another one pair of heads on the opposite side of the rotary drum every time the drum rotates by a half turn, and record one-field data every time the drum rotates by 1.5 turns (i.e., on six helical tracks).
As compared with that, to reduce an acoustic noise, the Digital Betacam Camcorder makes the drum rotation 1/2 time as small as the studio VTR and makes the number of heads two times (eight heads) as large. In other words, four-in-a-pair heads record data simultaneously on four tracks by the hour two times as long as usually.
The tape recorded in such a way can be directly played back by the studio VTR. To play back the tape by this VTR, however, eight PB heads are required. This system requires the time-base conversion (rate conversion) for REC/PB data. The RF Processing Block executes the time-base conversion.

• DRC-3 board
The DRC-3 board is an RF interface board.
In the REC mode, the DRC-3 board converts the two-channel parallel REC data sent from the Digital Processing Block in rate into 1/2 and distributes it to four-channel serial REC data. In the PB mode, this board multiplexes four-channel serial PB data and converts it into the two-channel parallel PB data (CONF DATA) of the normal rate.
The DRC-3 board also encodes the control data sent from Control Blocks to an MPX signal, sends it to the Drum assembly, and controls REC/PB amplifiers.

(2) Digital Processing Block
(DEN-1 board, DDE-1 board, DBD-1 board, and DAP-1 board)

The data processing on the following four digital processor boards is performed under communication with the System Control CPU.

• DEN-1 board
The DEN-1 board is a digital encoder board.
The DEN-1 board adds VITC data to the parallel video data sent from the Camera Block, then compresses the obtained data into a data rate of approximately 1/2 by a bit rate reduction encoder. The compressed video data is sent to an ECC encoder, and added outer ECC data and track-interleaved.
The serial audio data (ENCODE 1/2 and 3/4) from the DAP-1 board are also sent to the ECC encoder, and added outer ECC data and field-shuffled.
Then, the video data and audio data are multiplexed, inner ECC-encoded, and sent to the DRC-3 board as two-channel parallel REC DATA.

• DDE-1 board
The DDE-1 board is a digital decoder board.
First, an inner ECC decorder inner-corrects the two-channel parallel PB data (CONF DATA) from the DRC-3 board, de-interleaves and multiplexes the two-channel data, then divides the multiplexed data into V DATA and V/A DATA and sends them to an outer ECC decoder.
In the outer ECC decoder, video data is outer-corrected, then sent to the video decoder on the DBD-1 board. Audio data is outer-corrected, then error-concealed, transfered the clock rate via FIFO memory, and sent to the audio data processor on the DAP-1 board in the form of serial audio data (CONF AU 1/2 and 3/4) two by two channels.
For an NTSC system, a five-field sequence generator is provided so as to control the five-field sequence of audio PB data.

• DBD-1 board
The DBD-1 board is a video decoder board.
The BDB-1 board processes the video data sent from the DDE-1 board by a bit rate reduction decoder and returns to the parallel video data based on the former data rate. Then, if the data contains an error that cannot be corrected by the ECC decoder, it is error-concealed via FIFO memory, and sent to the Camera Block.

• DAP-1 board
On the DAP-1 board, an audio data processor that processes REC/PB audio data and an audio clock generator that generates timing signals are mounted.
The audio data processor takes in the data from the Camera Adaptor or the Audio Processing Block as REC audio data, processes the data as required, and sends it to the DEN-1 board. The audio data processor also processes the PB audio data from the DDE-1 board as required and sends it to the Camera Adaptor and Audio Processing Block. These data items are serial audio data two by two channels, respectively.
The audio clock generator generates various timing signals that are phase-adjusted based on the clock pulse and color frame pulse from the Camera Block, and sends them to the Audio Processing Block, the Servo Control Block, and the Camera Adaptor as well as each board of the Digital Processing Block so as to control the timing of data processing.

(3) Audio Processing Block
(CN-884 board (1/2), TC-75 board (1/2), CUE-2 board, VR-175 board, and MA-62 board)

The Audio Processing Block of the Digital Betacam Camcorder consists of two input channels and one output channel.
Whether to record the LINE/MIC input (REAR input) signal from the XLR connector on the rear panel or the camera microphone input (FRONT MIC input) signal from the front panel as an input signal is selected using an "AUDIO IN" switch.
Whether to output a CH-1, CH-2, or MIX signal to the AUDIO OUT terminal as an output signal is selected using a "MONITOR" switch.
An audio input signal is used instead of a cue input signal. A CH-1, CH-2, or MIX signal is selected using a "CUE IN" switch.

(4) System Control Block
(SY-191 board, TC-75 board (2/2), KY-293 board, HN-189 board (1/2), and CN-884 board (2/2))

The System Control Block performs the control for the peripheral boards and the overall system, and the control for its own system including the time code, display, key panel, and the like. Mainly, the SY-191 board controls the former, and the TC-75 board (2/2) controls the latter.

• SY-191 board
The SY-191 board mounts the System Control CPU that functions as a leading part in the System Control Block. The System Control CPU treats large volumes of data (e.g., communication with digital processors). Therefore, this CPU uses a 16-bit high-performance CPU with an operating clock of 10 MHz.
For the communication with digital processor ICs, the parallel bus is shifted in level (5 V/3.3 V) so as to establish the interface because the parallel interface ICs operate with 3.3 V.
The serial interface ICs directly interface with the SIO of the CPU. However, the CPU must serial-communicate moreover with SERVO MPU and TC MPU. Therefore, this CPU uses the same SIO in common and selects SCI (DPR), SCI (SV), or SCI (TC) using the SCI SELECTOR so as to communicate with them.
The System Control CPU also serial-communicates with the Camera Block. However, the CPU interfaces using another SIO because it differs from the VTR Block in a synchronous method.
An I/O EXPANDER covers up an insufficient I/O port.

• TC-75 board (2/2)
The TC MPU on the TC-75 board (2/2) controls TC IC (LTC reader and generator) while serial-communicating with the System Control CPU. It also controls the LCD module, key matrix, and character generator via the I/O EXPANDER.
The backup power supply using a lithium battery is provided to back up the generator, real-time data, and the like.

(5) Servo Control Block
(SV-148 board, SE-275/SE-210 board, CTL-10 board, and HN-189 board (2/2))

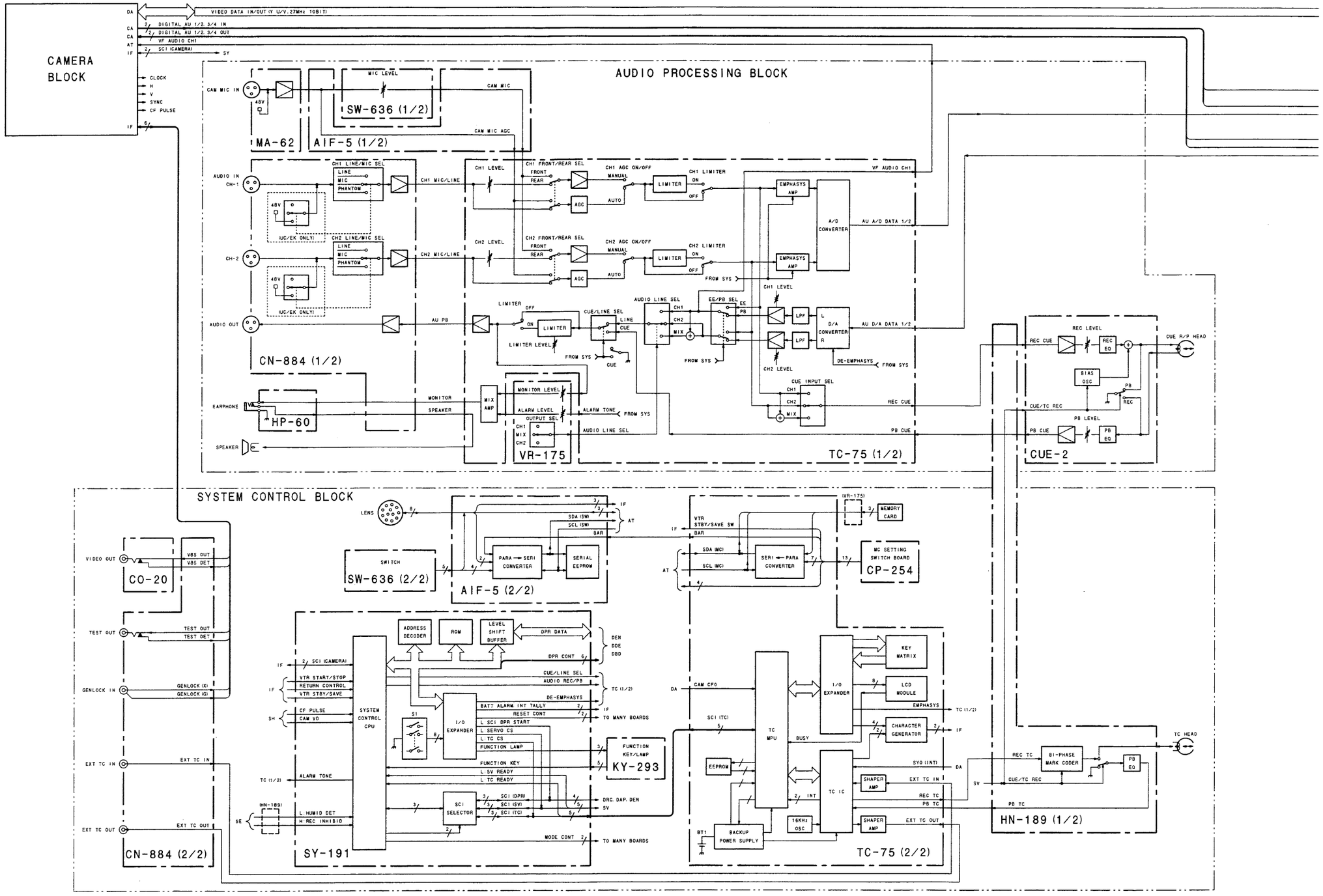
• SV-148 board
The SV-148 board mounts two MPUs. MPU1 controls the mode control and capstan servo control while serial-communicating with the System Control CPU. MPU2 controls the drum servo control while interfacing with MPU1.
A drum motor and capstan motor are controlled by the PWM switching drive based on the feedback servo of the FG/PG pulses and the FG/CTL pulses, respectively. A threading motor is controlled by a bi-directional motor driver.

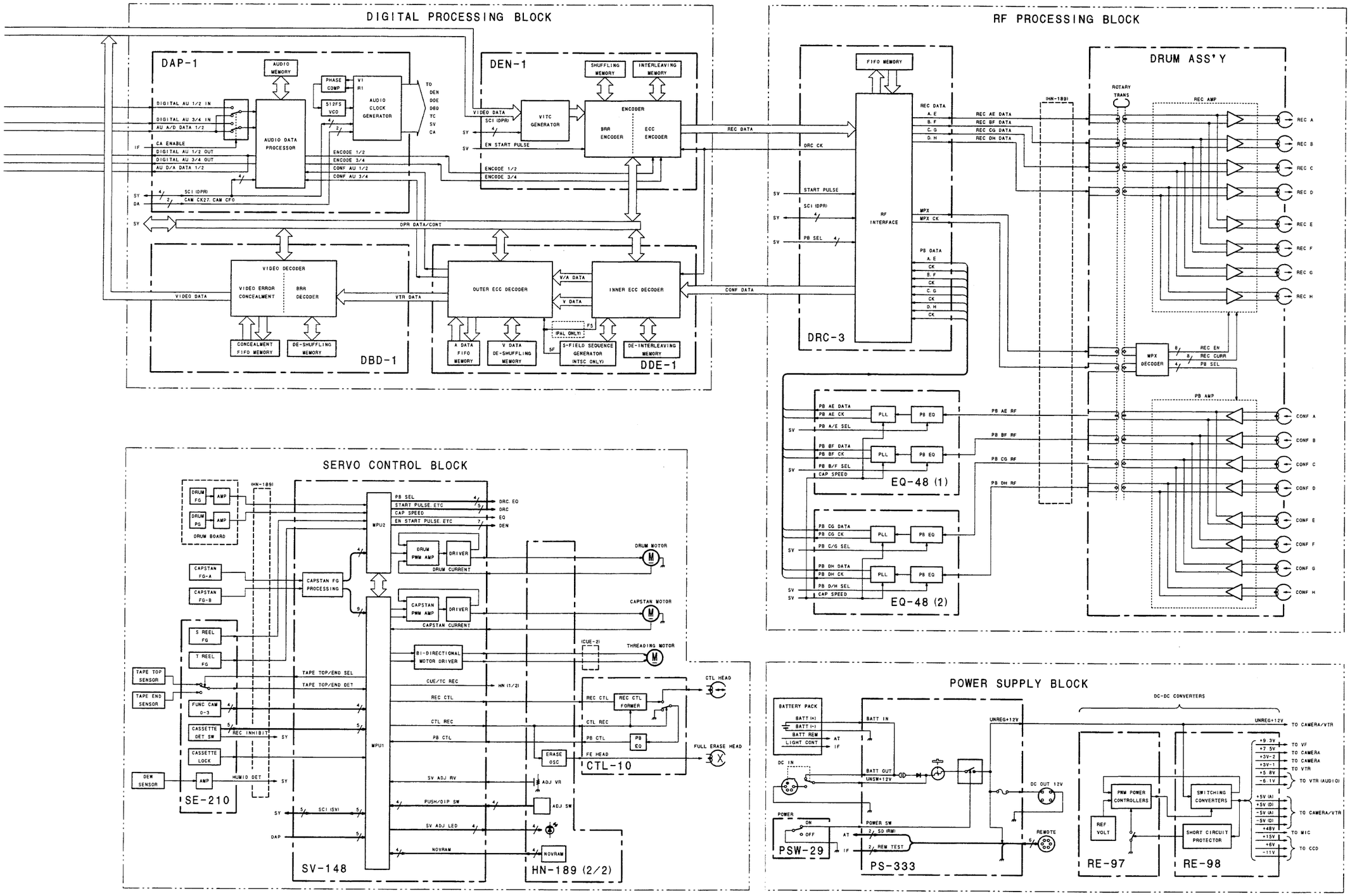
(6) Power Supply Block
(PS-333 board, RE-97 board, and RE-98 board)

• PS-333 board
The PS-333 board passes a voltage of 12 VDC from the battery pack or DC IN connector through a breaker and turns on or off the 12 VDC voltage every time the "POWER" switch is on or off. The 12 VDC voltage is then output as an UNREG voltage of +12 V.
This output voltage is supplied to the RE-98 board as well as the camera and VTR and converted into various DC voltages.

• RE-97 and RE-98 boards
The RE-97 and RE-98 boards constitute a DC-DC converter. These boards convert an UNREG voltage of +12 V from the PS-333 board into various DC voltages and supply them to the camera and VTR.
The converter system is an efficient PWM switching regulator system.
The RE-98 board mounts a short-circuit protector that cuts off all the output voltages simultaneously when any of the output pins is short-circuited.
A circuit that cuts off the output voltage when an input voltage became less than the guaranteed operating voltage is mounted, too.

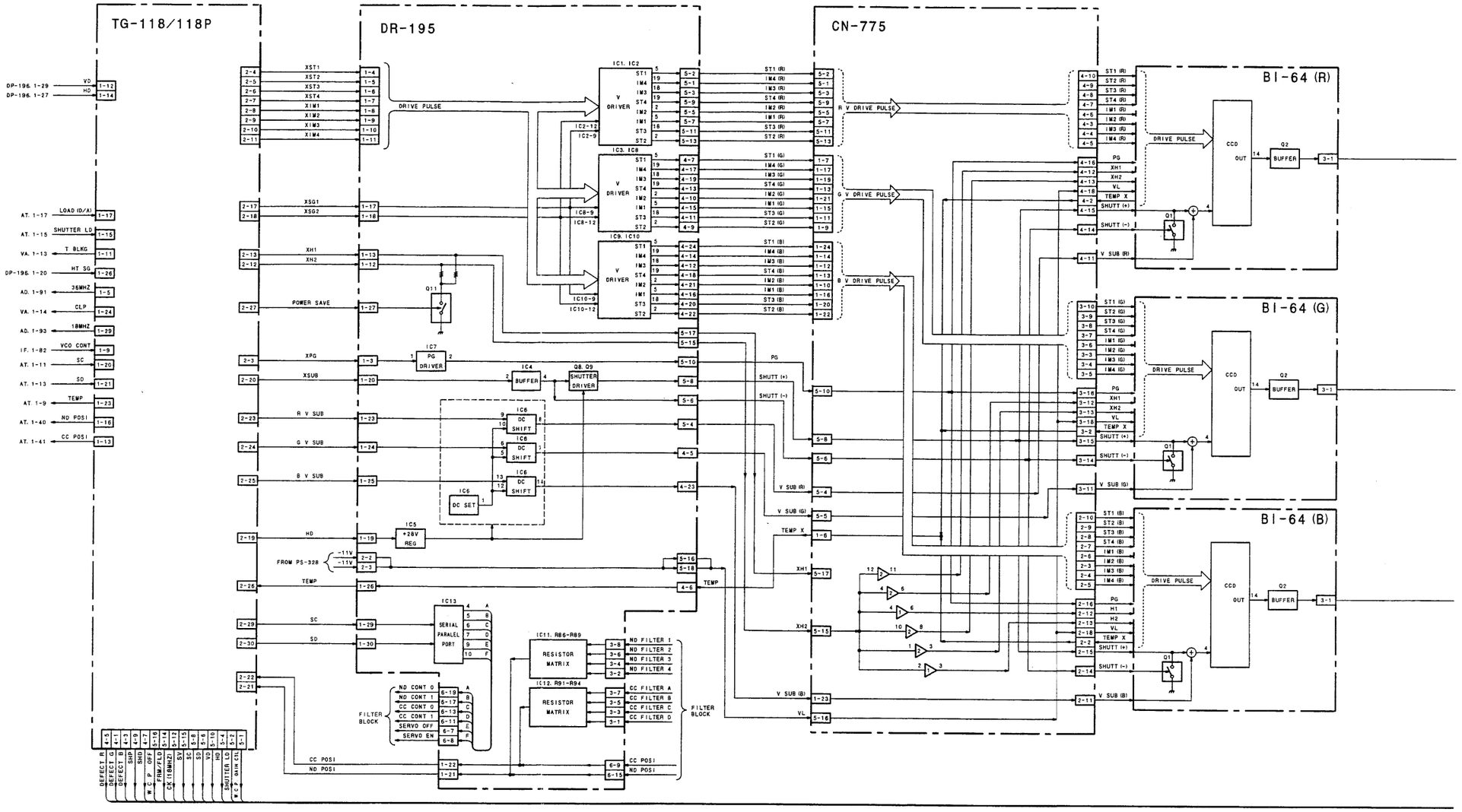
4-5

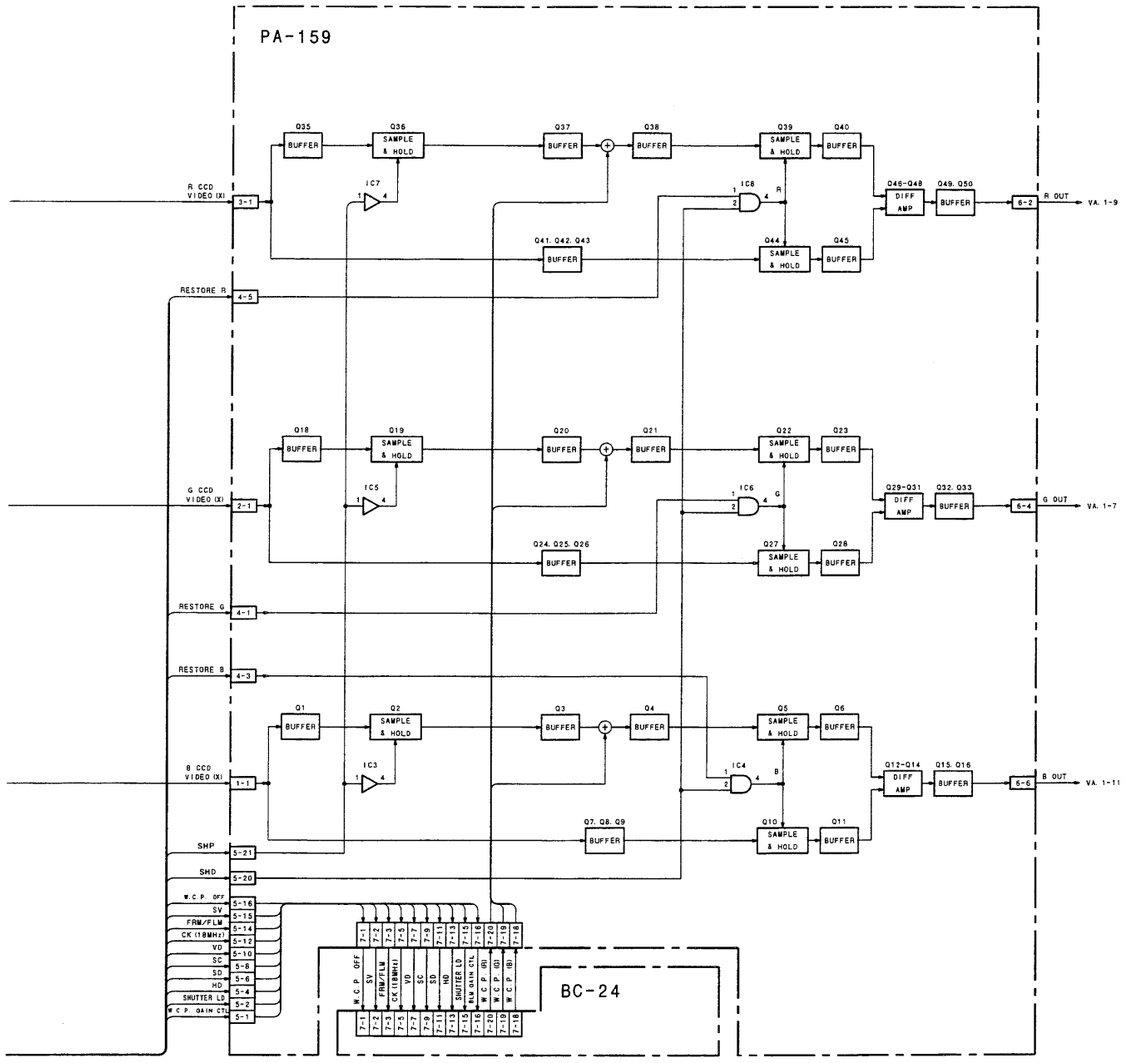

CAMERA BLOCK
VIDEO DATA IN/OUT (Y U/V 27MHz 10BIT)
DIGITAL AU 1/2, 3/4 IN
DIGITAL AU 1/2, 3/4 OUT
VF AUDIO CH1
SCI (CAMERA)
CLOCK
H
V
SYNC
CF PULSE
AUDIO PROCESSING BLOCK
CAM MIC IN
48V
MIC LEVEL
SW-636 (1/2)
CAM MIC
CAM MIC AGC
MA-62
AIF-5 (1/2)
AUDIO IN CH-1
CH1 LINE/MIC SEL
LINE
MIC
PHANTOM
CH1 MIC/LINE
CH1 LEVEL
CH1 FRONT/REAR SEL
FRONT
REAR
CH1 AGC ON/OFF
MANUAL
AUTO
AGC
LIMITER
CH1 LIMITER
ON
OFF
EMPHASYS AMP
A/D CONVERTER
VF AUDIO CH1
AU A/D DATA 1/2
IUC/EK ONLY!
CH-2
CH2 LINE/MIC SEL
CH2 MIC/LINE
CH2 LEVEL
CH2 FRONT/REAR SEL
CH2 AGC ON/OFF
CH2 LIMITER
FROM SYS
AUDIO OUT
AU PB
LIMITER
CUE/LINE SEL
LINE
CUE
LIMITER LEVEL
AUDIO LINE SEL
CH1
CH2
MIX
EE/PB SEL
EE
PB
L D/A CONVERTER R
LPF
DE-EMPHASYS
AU D/A DATA 1/2
CN-884 (1/2)
EARPHONE
HP-60
MONITOR
SPEAKER
MIX AMP
MONITOR LEVEL
ALARM LEVEL
ALARM TONE
OUTPUT SEL
VR-175
TC-75 (1/2)
REC CUE
PB CUE
REC LEVEL
REC EQ
CUE R/P HEAD
BIAS OSC
CUE/TC REC
PB LEVEL
PB EQ
CUE-2
SYSTEM CONTROL BLOCK
LENS
SDA (SW)
SCL (SW)
BAR
SWITCH
SW-636 (2/2)
PARA → SERI CONVERTER
SERIAL EEPROM
AIF-5 (2/2)
VTR STBY/SAVE SW
SDA (MC)
SCL (MC)
SERI → PARA CONVERTER
MEMORY CARD
MC SETTING SWITCH BOARD
CP-254
VIDEO OUT
VBS OUT
VBS DET
CO-20
TEST OUT
TEST DET
GENLOCK IN
GENLOCK (X)
GENLOCK (G)
EXT TC IN
EXT TC OUT
CN-884 (2/2)
ADDRESS DECODER
ROM
LEVEL SHIFT BUFFER
DPR DATA
DPR CONT
DEN
DDE
DBD
SCI (CAMERA)
VTR START/STOP
RETURN CONTROL
VTR STBY/SAVE
CF PULSE
CAM VD
SYSTEM CONTROL CPU
CUE/LINE SEL
AUDIO REC/PB
DE-EMPHASYS
BATT ALARM INT TALLY
RESET CONT
TO MANY BOARDS
I/O EXPANDER
L: SCI DPR START
L: SERVO CS
L: TC CS
FUNCTION LAMP
FUNCTION KEY
L: SV READY
L: TC READY
FUNCTION KEY/LAMP
KY-293
ALARM TONE
SCI SELECTOR
SCI (DPR)
SCI (SV)
SCI (TC)
DRC, DAP, DEN
SV
L: HUMID DET
H: REC INHIBID
MODE CONT
SY-191
CAM CFD
SCI (TC)
TC MPU
EEPROM
BUSY
I/O EXPANDER
KEY MATRIX
LCD MODULE
CHARACTER GENERATOR
EMPHASYS
SYO (INT)
TC IC
SHAPER AMP
EXT TC IN
REC TC
PB TC
EXT TC OUT
16KHz OSC
BACKUP POWER SUPPLY
BT1
TC-75 (2/2)
TC HEAD
REC TC
BI-PHASE MARK CODER
PB EQ
CUE/TC REC
HN-189 (1/2)


DIGITAL PROCESSING BLOCK
DAP-1
AUDIO MEMORY
PHASE COMP
512FS VCO
V1
R1
AUDIO CLOCK GENERATOR
TO DEN
TO DDE
TO DBD
TC
SV
CA
AUDIO DATA PROCESSOR
DIGITAL AU 1/2 IN
DIGITAL AU 3/4 IN
AU A/D DATA 1/2
CA ENABLE
DIGITAL AU 1/2 OUT
DIGITAL AU 3/4 OUT
AU D/A DATA 1/2
ENCODE 1/2
ENCODE 3/4
CONF AU 1/2
CONF AU 3/4
SCI (DPR)
CAM CK27, CAM CF0
DPR DATA/CONT
DEN-1
SHUFFLING MEMORY
INTERLEAVING MEMORY
VIDEO DATA
SCI (DPR)
EN START PULSE
VITC GENERATOR
ENCODER
BRR ENCODER
ECC ENCODER
ENCODE 1/2
ENCODE 3/4
VIDEO DECODER
VIDEO ERROR CONCEALMENT
BRR DECODER
CONCEALMENT FIFO MEMORY
DE-SHUFFLING MEMORY
DBD-1
VIDEO DATA
VTR DATA
OUTER ECC DECODER
INNER ECC DECODER
V/A DATA
V DATA
(PAL ONLY)
FS
SF
A DATA FIFO MEMORY
V DATA DE-SHUFFLING MEMORY
3-FIELD SEQUENCE GENERATOR (NTSC ONLY)
DE-INTERLEAVING MEMORY
DDE-1
CONF DATA
REC DATA
RF PROCESSING BLOCK
FIFO MEMORY
DRC CK
START PULSE
SCI (DPR)
PB SEL
RF INTERFACE
DRC-3
REC DATA
A, E
B, F
C, G
D, H
REC AE DATA
REC BF DATA
REC CG DATA
REC DH DATA
MPX
MPX CK
PB DATA
CK
DRUM ASS'Y
ROTARY TRANS
(HN-189)
REC AMP
REC A
REC B
REC C
REC D
REC E
REC F
REC G
REC H
MPX DECODER
REC EN
REC CURR
PB SEL
PB AMP
CONF A
CONF B
CONF C
CONF D
CONF E
CONF F
CONF G
CONF H
PB AE DATA
PB AE CK
PB A/E SEL
PB BF DATA
PB BF CK
PB B/F SEL
PB CG DATA
PB CG CK
PB C/G SEL
PB DH DATA
PB DH CK
PB D/H SEL
CAP SPEED
PLL
PB EQ
PB AE RF
PB BF RF
PB CG RF
PB DH RF
EQ-48 (1)
EQ-48 (2)
SERVO CONTROL BLOCK
DRUM FG
AMP
DRUM BOARD
CAPSTAN FG-A
CAPSTAN FG-B
S REEL FG
T REEL FG
TAPE TOP SENSOR
TAPE END SENSOR
FUNC CAM 0-3
CASSETTE DET SW
CASSETTE LOCK
DEW SENSOR
HUMID DET
REC INHIBIT
SE-210
MPU2
MPU1
CAPSTAN FG PROCESSING
PB SEL
START PULSE ETC
CAP SPEED
EN START PULSE ETC
DRC EQ
DRC
EQ
DEN
DRUM PWM AMP
DRIVER
DRUM CURRENT
DRUM MOTOR
CAPSTAN PWM AMP
CAPSTAN CURRENT
CAPSTAN MOTOR
BI-DIRECTIONAL MOTOR DRIVER
(CUE-2)
THREADING MOTOR
TAPE TOP/END SEL
TAPE TOP/END DET
CUE/TC REC
HN (1/2)
REC CTL
CTL REC
PB CTL
SV ADJ RV
PUSH/DIP SW
SV ADJ LED
NOVRAM
ADJ VR
ADJ SW
REC CTL FORMER
PB EQ
ERASE OSC
FE HEAD
CTL HEAD
FULL ERASE HEAD
CTL-10
SCI (SV)
DAP
SV-148
HN-189 (2/2)
POWER SUPPLY BLOCK
BATTERY PACK
BATT (+)
BATT (-)
BATT REM
LIGHT CONT
DC IN
POWER
ON
OFF
PSW-29
BATT IN
BATT OUT
UNSW+12V
UNREG+12V
AT
IF
POWER SW
REW TEST
REMOTE
DC OUT 12V
PS-333
DC-DC CONVERTERS
TO CAMERA/VTR
PWM POWER CONTROLLERS
REF VOLT
SWITCHING CONVERTERS
SHORT CIRCUIT PROTECTOR
RE-97
RE-98
+9.3V
+7.5V
+3V-2
+3V-1
+5.8V
-6.1V
TO VF
TO CAMERA
TO CAMERA
TO VTR
TO VTR (AUDIO)
+5V (A)
+5V (D)
-5V (A)
-5V (D)
+48V
TO CAMERA/VTR
TO MIC
+15V
+6V
-11V
TO CCD

OVERALL (VTR)

4-2. CIRCUIT BLOCK (CAMERA)





CCD BLOCK

TIMING GENERATOR
TG-118

CCD DRIVER
DR-195

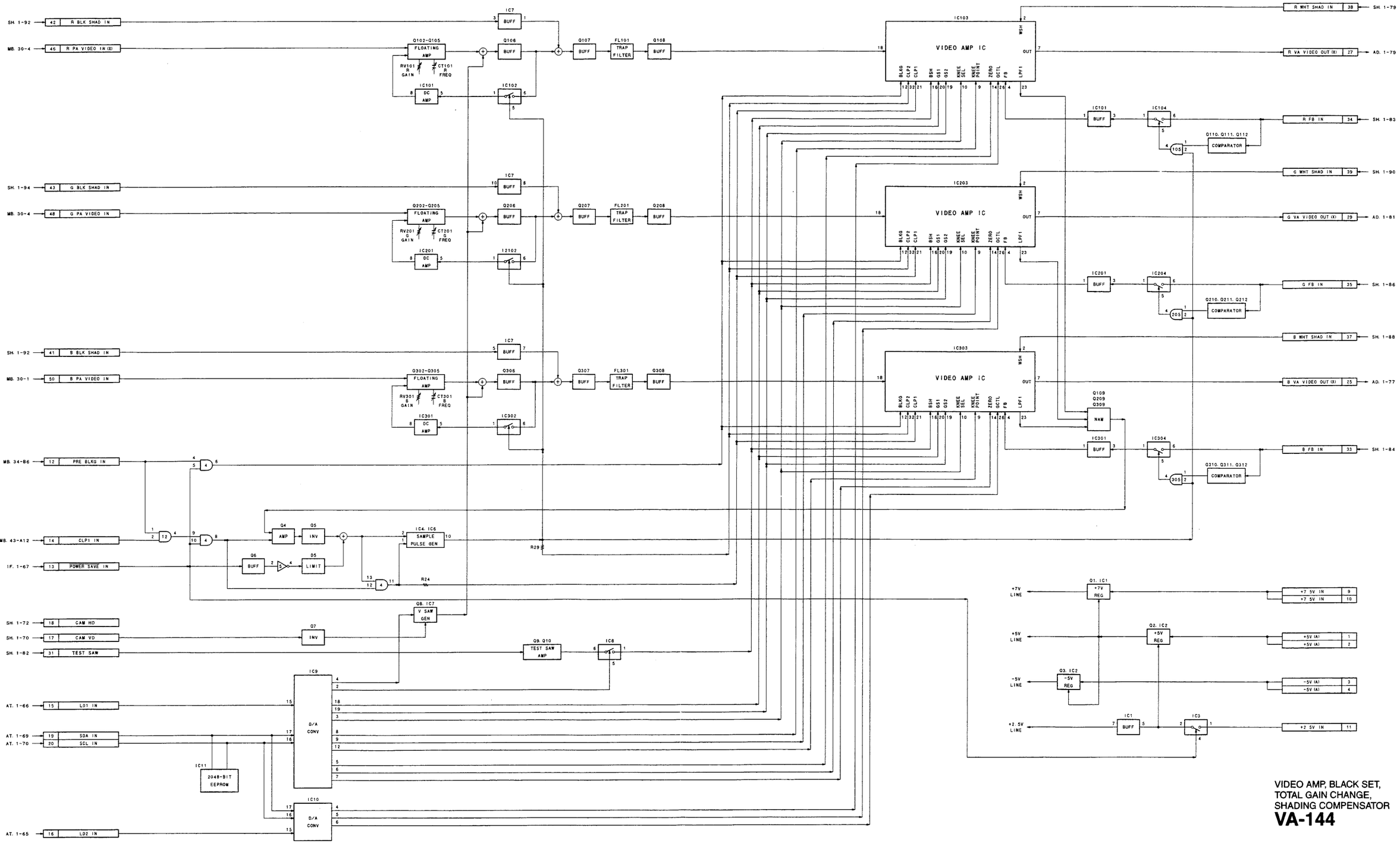
CONNECTOR PCB FOR BI-64
CN-775

CCD MOUNT
BI-64 (R/G/B)

PRE-AMP (SAMPLE & HOLD)
PA-159

BC-24

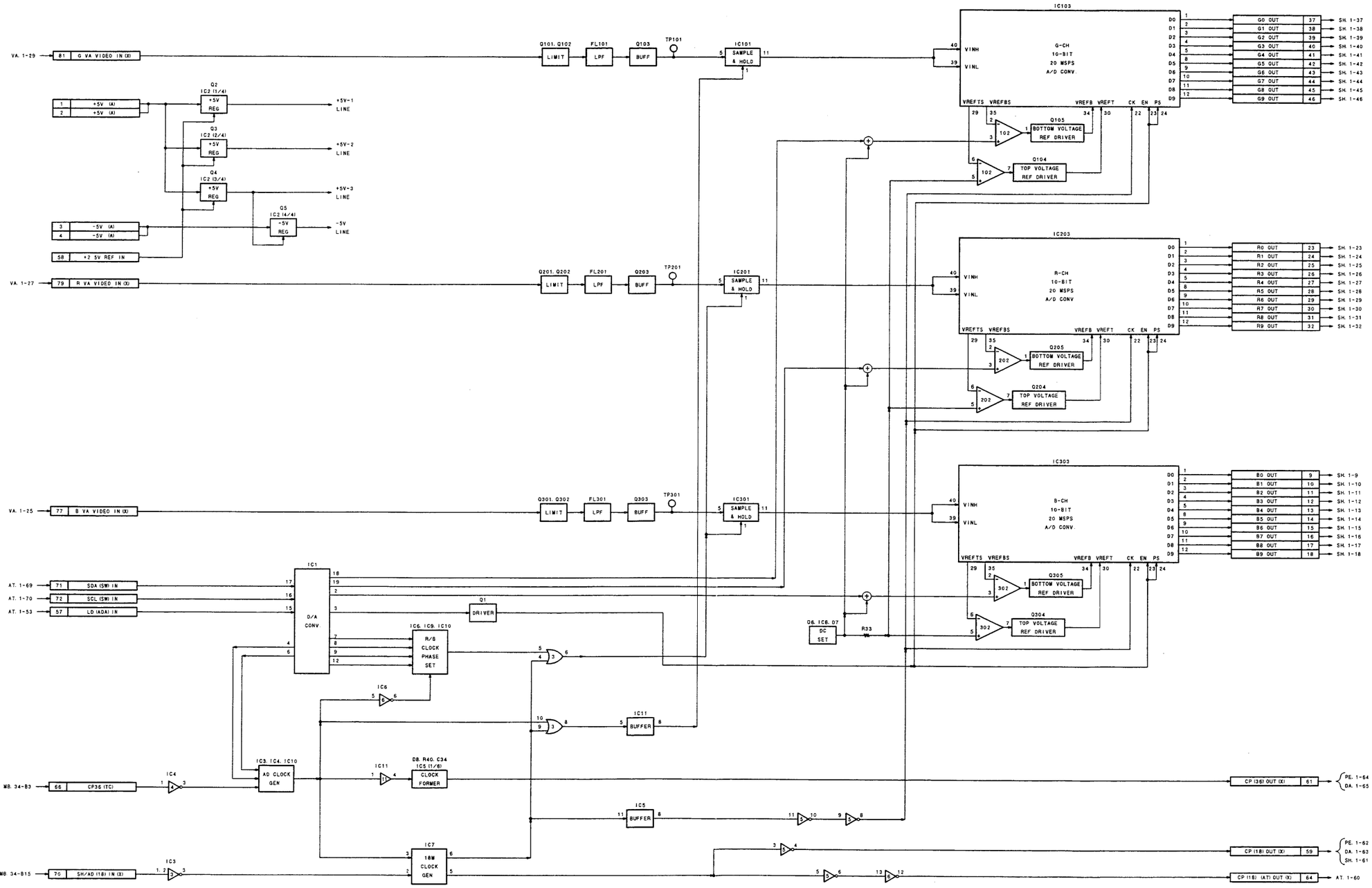
VA-144 Block Diagram



VIDEO AMP, BLACK SET, TOTAL GAIN CHANGE, SHADING COMPENSATOR

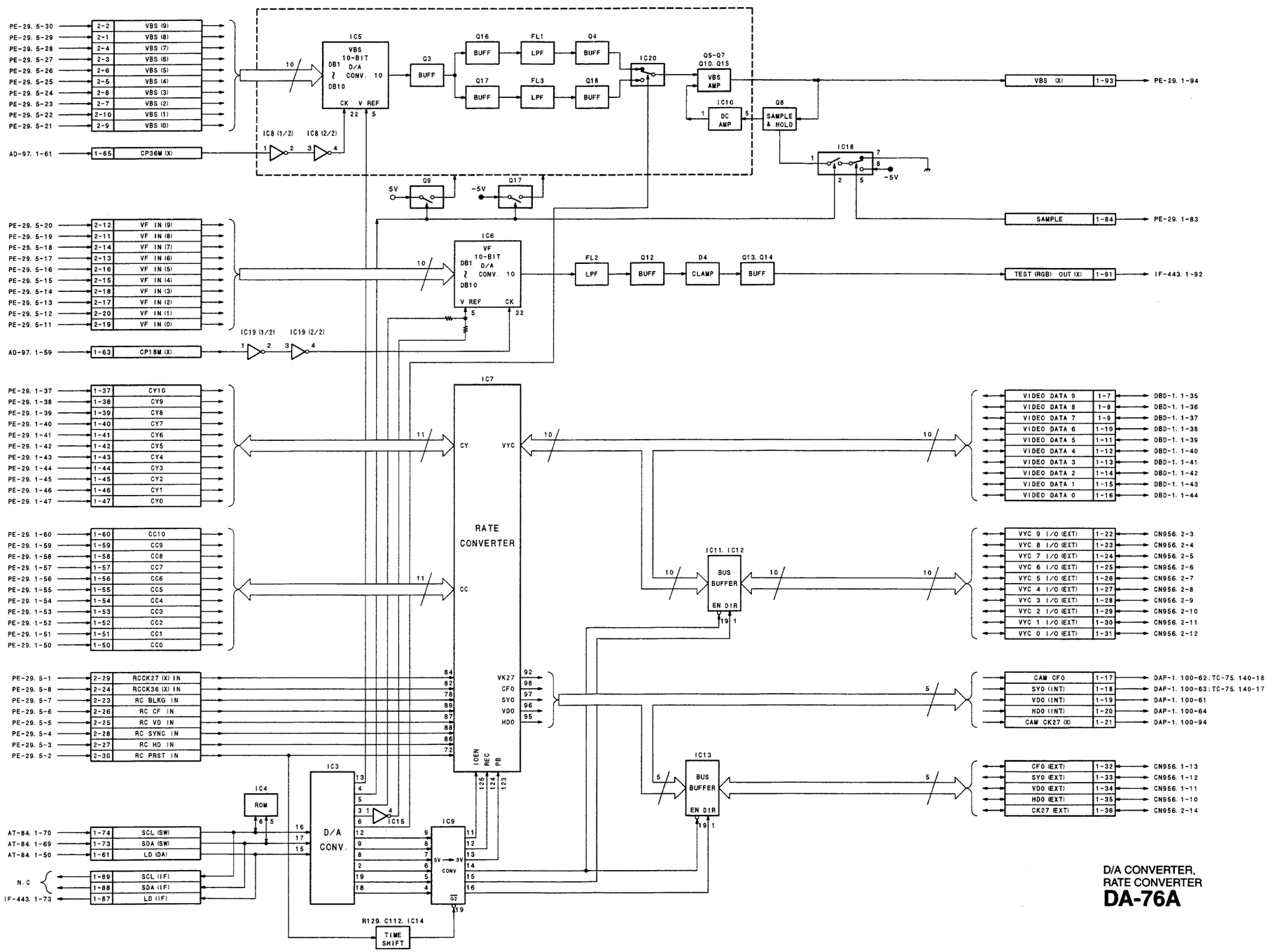
VA-144

4-10



A/D CONVERTER
AD-97

DA-76A Block Diagram

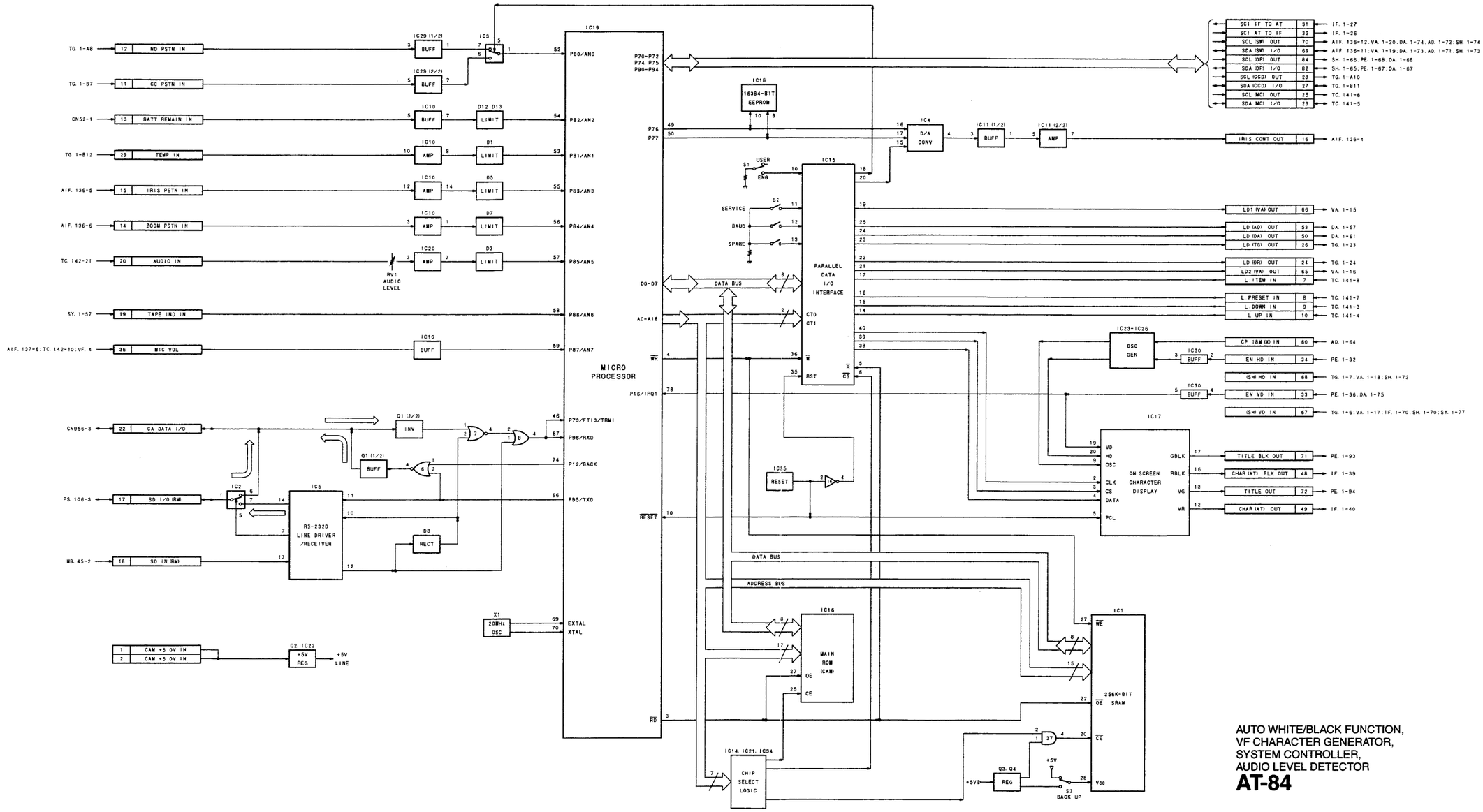


D/A CONVERTER, RATE CONVERTER

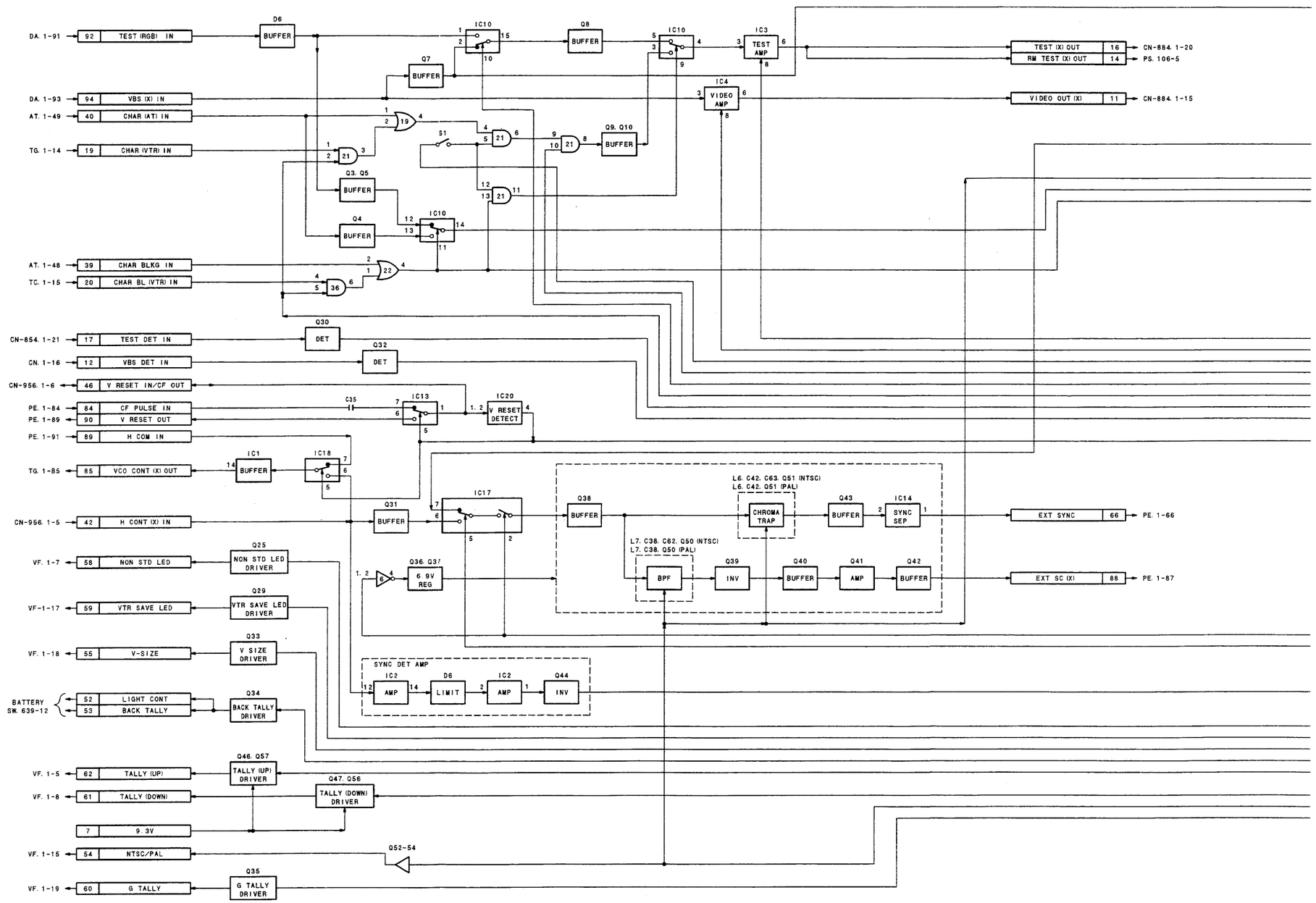
DA-76A

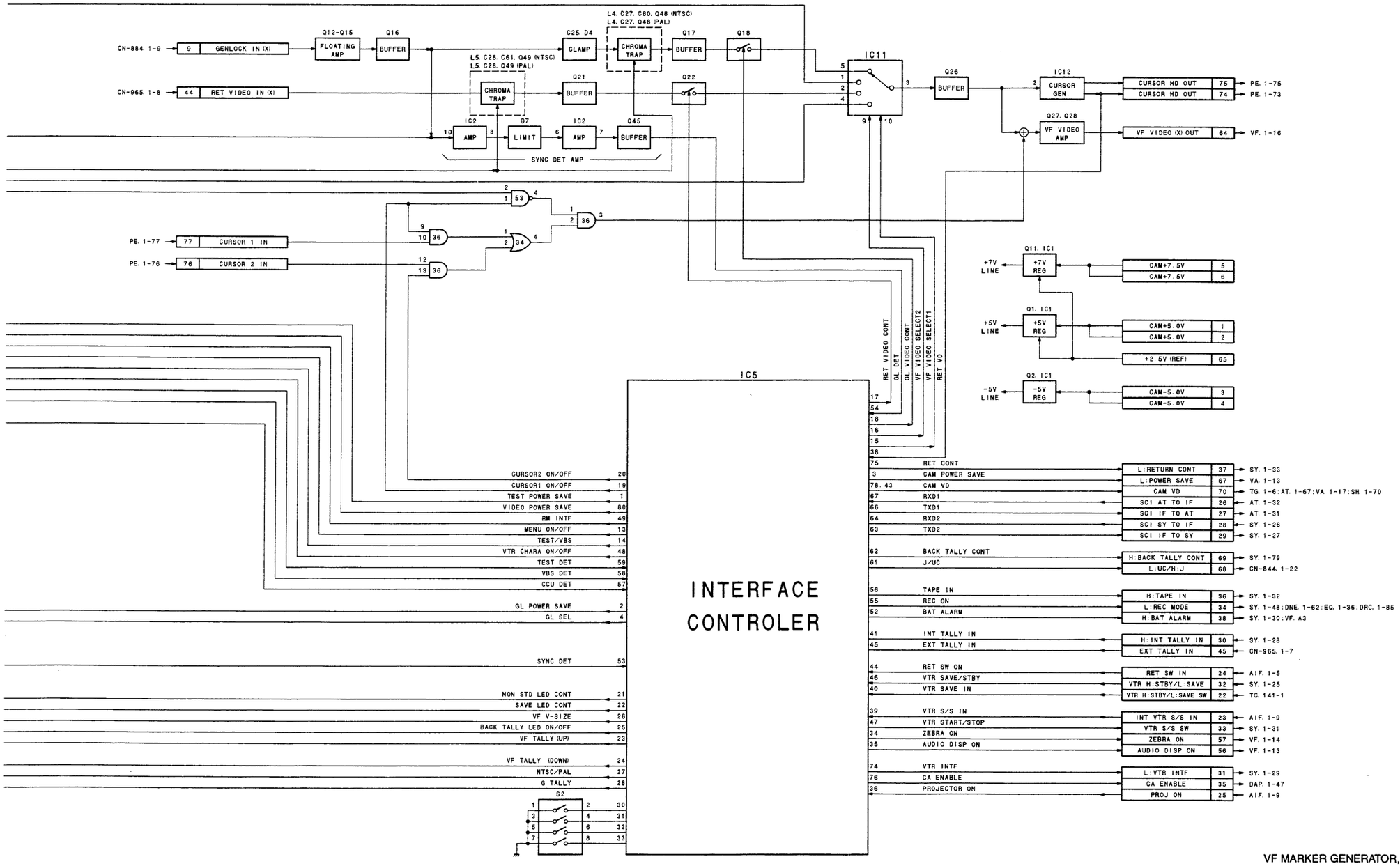
4-12

http://getMANUAL.com
AT-84 Block Diagram

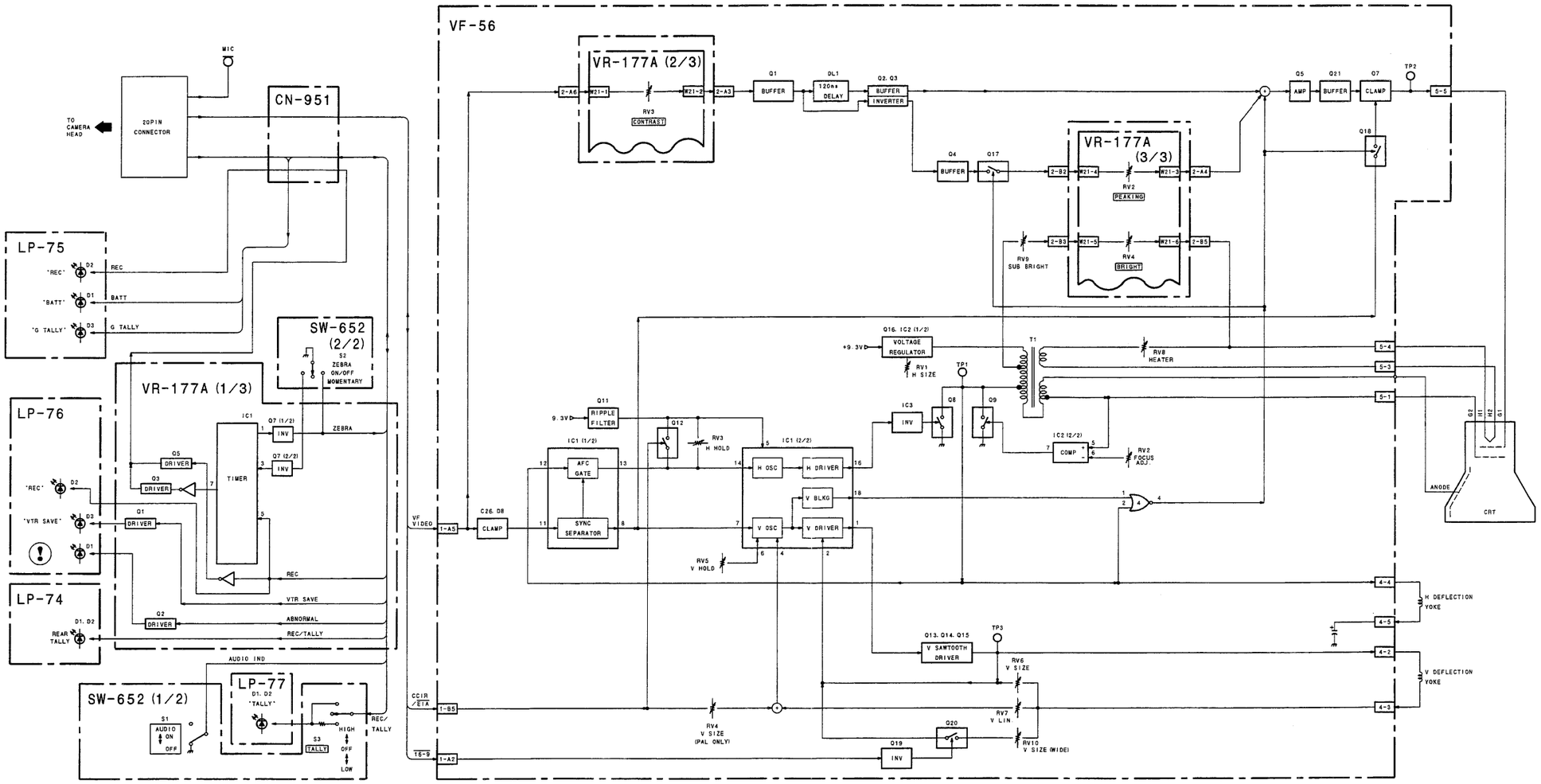


AUTO WHITE/BLACK FUNCTION,
VF CHARACTER GENERATOR,
SYSTEM CONTROLLER,
AUDIO LEVEL DETECTOR
AT-84


DA. 1-91
92
TEST (RGB) IN
D6
BUFFER
IC10
Q8
BUFFER
IC10
IC3
TEST AMP
TEST (X) OUT
16
CN-884. 1-20
RM TEST (X) OUT
14
PS. 106-5
Q7
BUFFER
DA. 1-93
94
VBS (X) IN
IC4
VIDEO AMP
VIDEO OUT (X)
11
CN-884. 1-15
AT. 1-49
40
CHAR (AT) IN
TG. 1-14
19
CHAR (VTR) IN
S1
Q9. Q10
BUFFER
Q3. Q5
BUFFER
Q4
BUFFER
IC10
AT. 1-48
39
CHAR BLKG IN
TC. 1-15
20
CHAR BL (VTR) IN
Q30
DET
CN-854. 1-21
17
TEST DET IN
Q32
DET
CN. 1-16
12
VBS DET IN
CN-956. 1-6
46
V RESET IN/CF OUT
C35
IC13
IC20
V RESET DETECT
PE. 1-84
84
CF PULSE IN
PE. 1-89
90
V RESET OUT
PE. 1-91
89
H COM IN
IC1
BUFFER
IC18
TG. 1-85
85
VCO CONT (X) OUT
IC17
Q31
BUFFER
CN-956. 1-5
42
H CONT (X) IN
L6. C42. C63. Q51 (NTSC)
L6. C42. Q51 (PAL)
Q38
BUFFER
CHROMA TRAP
Q43
BUFFER
IC14
SYNC SEP
EXT SYNC
66
PE. 1-66
L7. C38. C62. Q50 (NTSC)
L7. C38. Q50 (PAL)
Q25
NON STD LED DRIVER
VF. 1-7
58
NON STD LED
Q36. Q37
6.9V REG
BPF
Q39
INV
Q40
BUFFER
Q41
AMP
Q42
BUFFER
EXT SC (X)
88
PE. 1-87
Q29
VTR SAVE LED DRIVER
VF-1-17
59
VTR SAVE LED
Q33
V SIZE DRIVER
VF. 1-18
55
V-SIZE
SYNC DET AMP
IC2
AMP
D6
LIMIT
IC2
AMP
Q44
INV
BATTERY SW. 639-12
52
LIGHT CONT
53
BACK TALLY
Q34
BACK TALLY DRIVER
Q46. Q57
TALLY (UP) DRIVER
VF. 1-5
62
TALLY (UP)
Q47. Q56
TALLY (DOWN) DRIVER
VF. 1-8
61
TALLY (DOWN)
7
9.3V
Q52-54
VF. 1-15
54
NTSC/PAL
Q35
G TALLY DRIVER
VF. 1-19
60
G TALLY

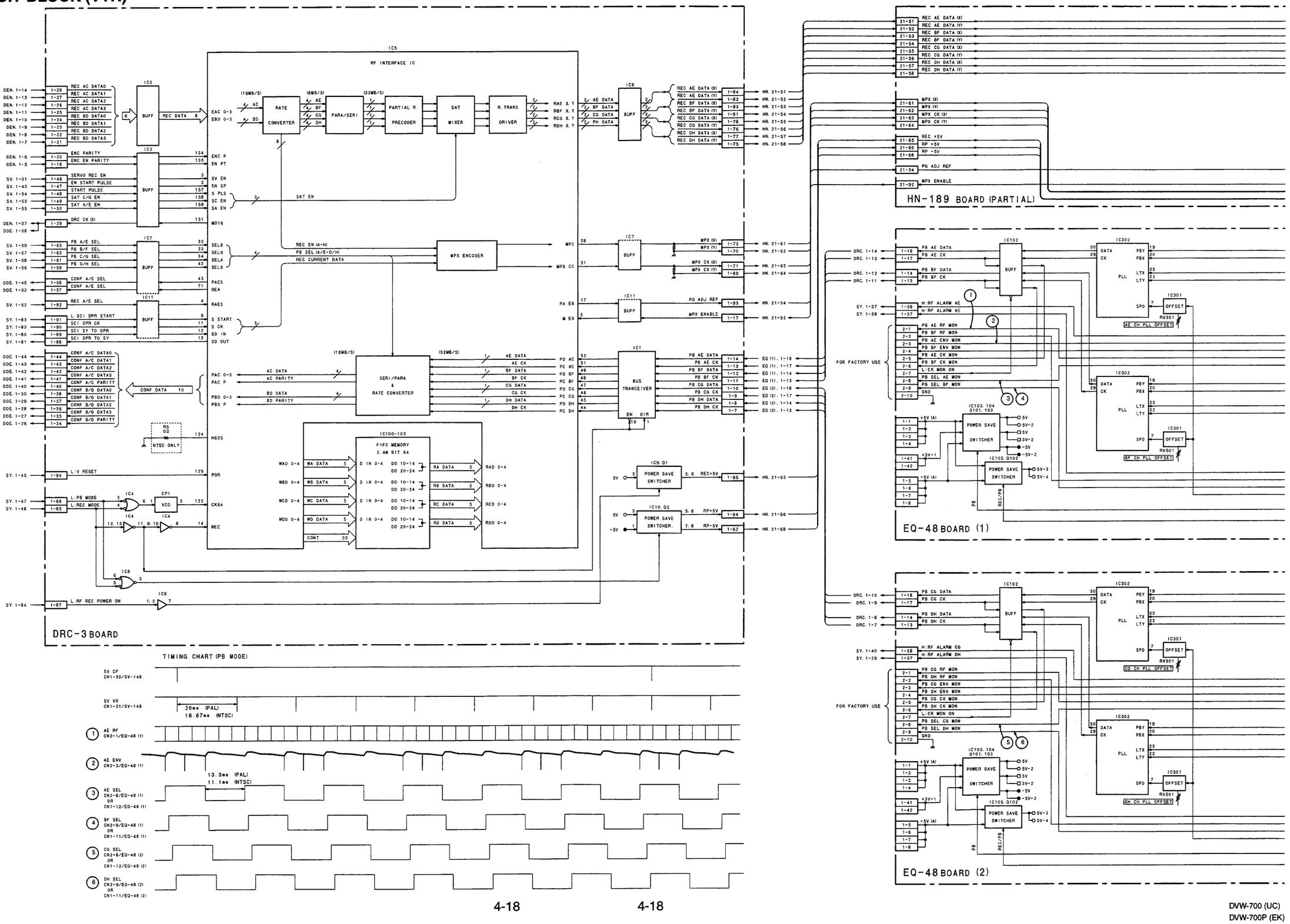


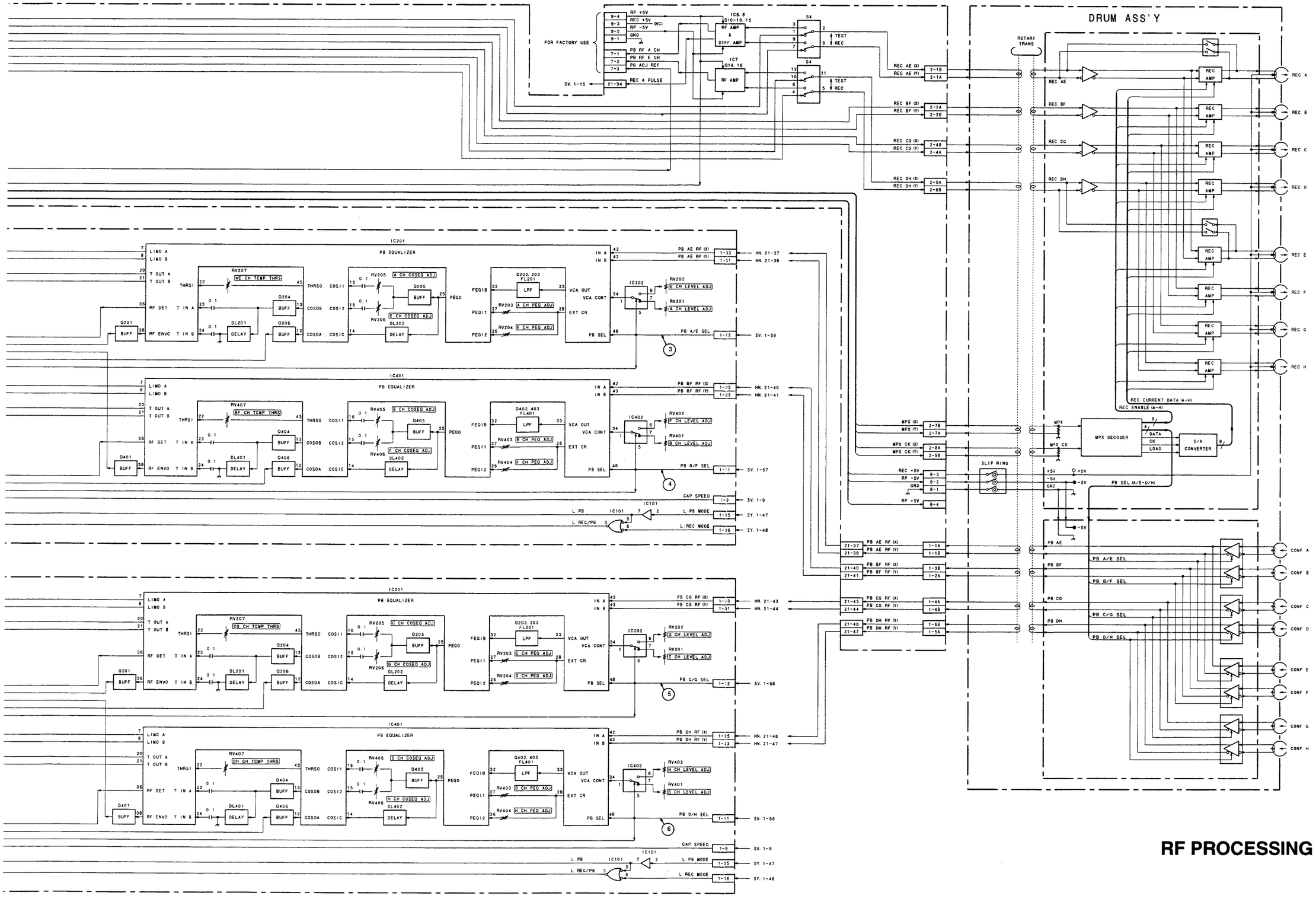
VF MARKER GENERATOR,
VTR INTERFACE,
SYNC SEPARATOR
IF-443


VF-56
VR-177A (2/3)
RV3 CONTRAST
Q1 BUFFER
DL1 120ns DELAY
Q2. Q3 BUFFER INVERTER
Q4 BUFFER
Q17
VR-177A (3/3)
RV2 PEAKING
RV9 SUB BRIGHT
RV4 BRIGHT
Q5 AMP
Q21 BUFFER
Q7 CLAMP
TP2
Q18
Q16. IC2 (1/2) VOLTAGE REGULATOR
+9.3V
RV1 H SIZE
T1
RV8 HEATER
Q11 RIPPLE FILTER
9.3V
Q12
RV3 H HOLD
IC1 (1/2) AFC GATE
SYNC SEPARATOR
IC1 (2/2) H OSC
H DRIVER
V BLKG
V OSC
V DRIVER
IC3 INV
Q8
Q9
IC2 (2/2) COMP
RV2 FOCUS ADJ.
RV5 V HOLD
VF VIDEO
C26. D8 CLAMP
CRT
ANODE
H DEFLECTION YOKE
V DEFLECTION YOKE
Q13. Q14. Q15 V SAWTOOTH DRIVER
TP3
RV6 V SIZE
RV7 V LIN
RV10 V SIZE (WIDE)
Q20
Q19 INV
CCIR /ETA
RV4 V SIZE (PAL ONLY)
CN-951
MIC
TO CAMERA HEAD
20PIN CONNECTOR
LP-75
"REC" D2 REC
"BATT" D1 BATT
"G TALLY" D3 G TALLY
SW-652 (2/2)
S2 ZEBRA ON/OFF MOMENTARY
VR-177A (1/3)
LP-76
"REC" D2
"VTR SAVE" D3
D1
LP-74
REAR TALLY D1. D2
IC1
Q7 (1/2) INV
Q7 (2/2) INV
ZEBRA
Q5 DRIVER
Q3 DRIVER
Q1 DRIVER
Q2 DRIVER
TIMER
REC
VTR SAVE
ABNORMAL
REC/TALLY
AUDIO IND
SW-652 (1/2)
S1 AUDIO ON OFF
LP-77
D1. D2 "TALLY"
S3 TALLY
HIGH OFF LOW
REC/ TALLY

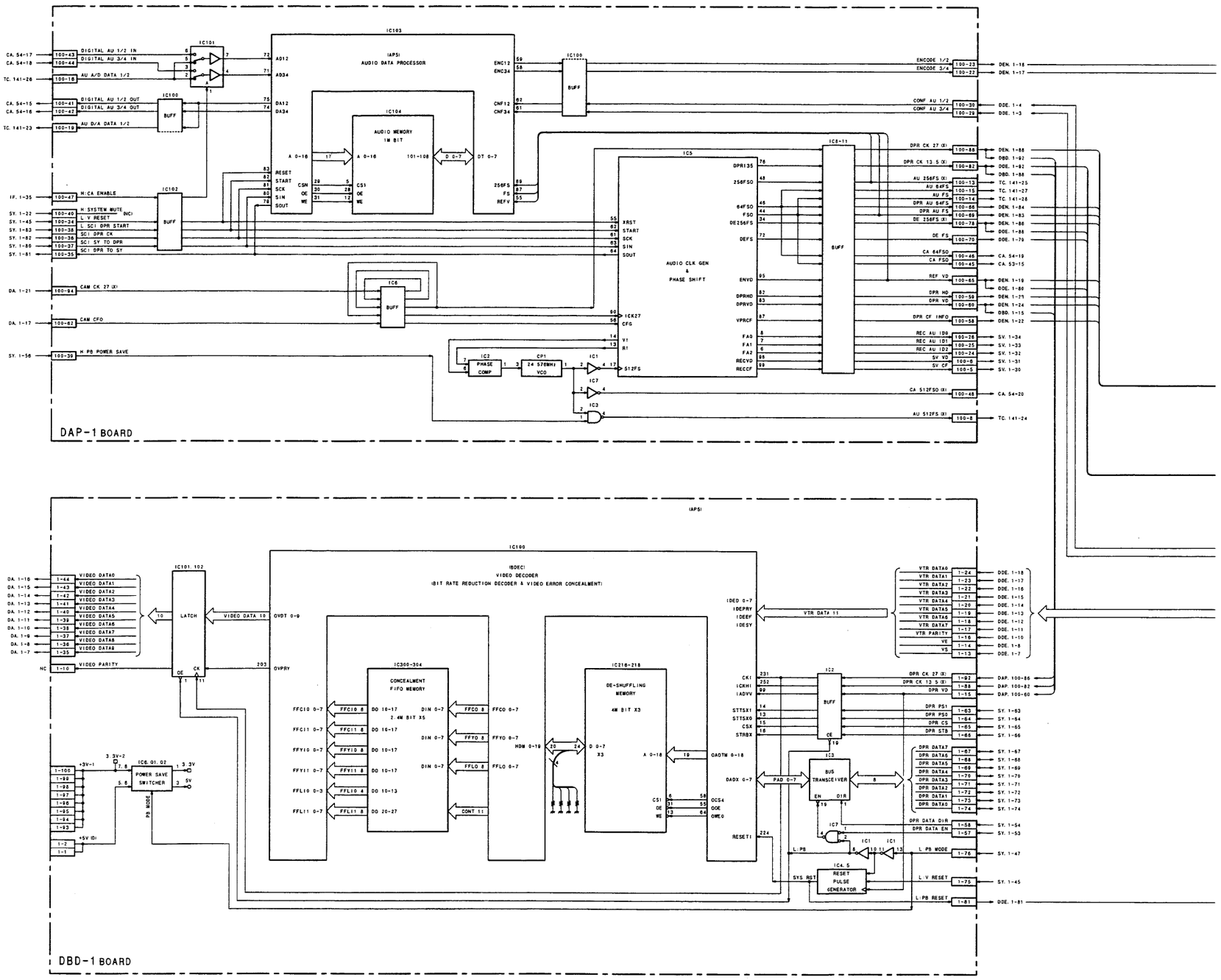
VIEWFINDER

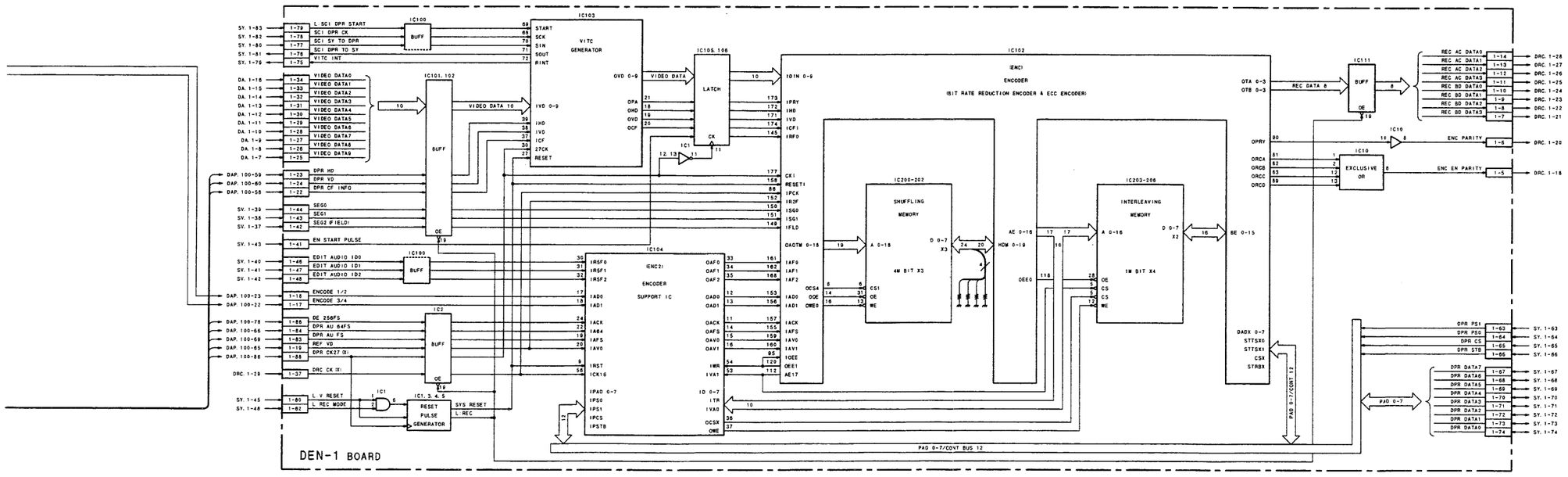
4-3. CIRCUIT BLOCK (VTR)

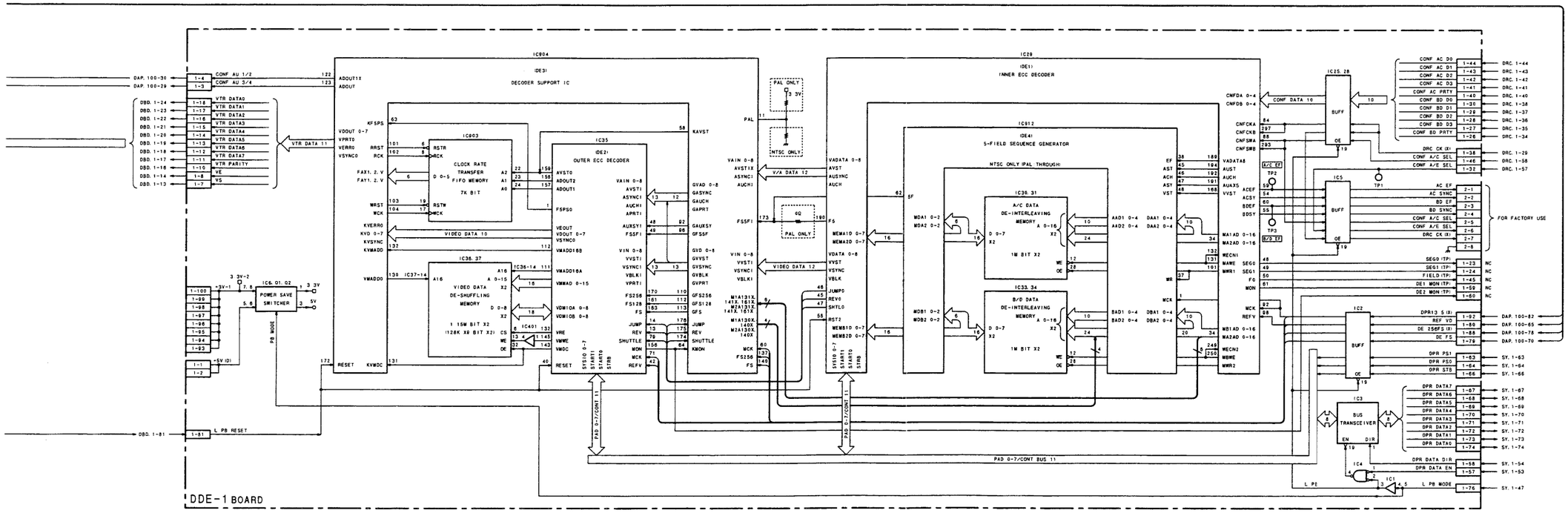




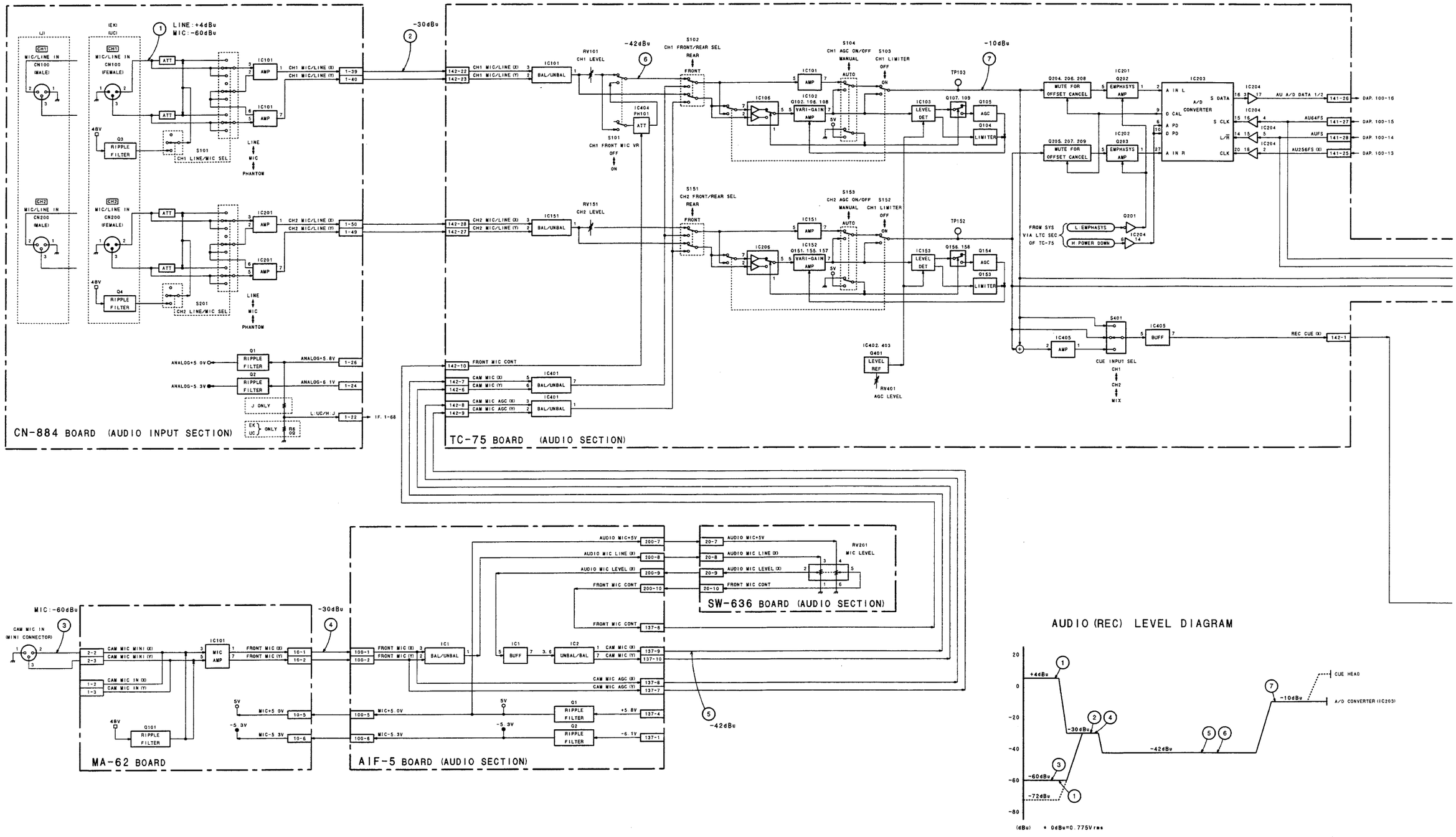
RF PROCESSING


DAP-1 BOARD
DBD-1 BOARD
IC103
IAPS)
AUDIO DATA PROCESSOR
IC104
AUDIO MEMORY
1M BIT
IC5
AUDIO CLK GEN
&
PHASE SHIFT
IC8-11
IC6
IC2
PHASE
COMP
CP1
24.576MHz
VCO
IC1
IC7
IC3
IC100
BUFF
IC101, 102
LATCH
IC6, 01, 02
POWER SAVE
SWITCHER
IC100
IBDEC)
VIDEO DECODER
(BIT RATE REDUCTION DECODER & VIDEO ERROR CONCEALMENT)
IC300-304
CONCEALMENT
FIFO MEMORY
2.4M BIT X5
IC216-218
DE-SHUFFLING
MEMORY
4M BIT X3
IC2
BUFF
IC3
BUS
TRANSCEIVER
IC4, 5
RESET
PULSE
GENERATOR
CA. 54-17
CA. 54-18
TC. 141-26
DIGITAL AU 1/2 IN
DIGITAL AU 3/4 IN
AU A/D DATA 1/2
CA. 54-15
CA. 54-16
TC. 141-23
DIGITAL AU 1/2 OUT
DIGITAL AU 3/4 OUT
AU D/A DATA 1/2
IF. 1-35
H CA ENABLE
SY. 1-22
SY. 1-45
SY. 1-83
SY. 1-82
SY. 1-80
SY. 1-81
H SYSTEM MUTE (NC)
L V RESET
L SCI DPR START
SCI DPR CK
SCI SY TO DPR
SCI DPR TO SY
DA. 1-21
DA. 1-17
CAM CK 27 (X)
CAM CFO
SY. 1-56
H PB POWER SAVE
ENCODE 1/2
ENCODE 3/4
CONF AU 1/2
CONF AU 3/4
DPR CK 27 (X)
DPR CK 13.5 (X)
AU 256FS (X)
AU 64FS
AU FS
DPR AU 64FS
DPR AU FS
DE 256FS (X)
DE FS
CA 64FSO
CA FSO
REF VD
DPR HD
DPR VD
DPR CF INFO
REC AU ID0
REC AU ID1
REC AU ID2
SV VD
SV CF
CA 512FSO (X)
AU 512FS (X)
DEN. 1-18
DEN. 1-17
DDE. 1-4
DDE. 1-3
DEN. 1-86
DBD. 1-87
DDE. 1-87
DBD. 1-88
TC. 141-25
TC. 141-27
TC. 141-28
DEN. 1-84
DEN. 1-83
DEN. 1-86
DDE. 1-86
DDE. 1-79
CA. 54-19
CA. 53-15
DEN. 1-19
DDE. 1-80
DEN. 1-21
DEN. 1-24
DBD. 1-15
DEN. 1-22
SV. 1-34
SV. 1-33
SV. 1-32
SV. 1-31
SV. 1-30
CA. 54-20
TC. 141-24
VIDEO DATA0
VIDEO DATA1
VIDEO DATA2
VIDEO DATA3
VIDEO DATA4
VIDEO DATA5
VIDEO DATA6
VIDEO DATA7
VIDEO DATA8
VIDEO DATA9
VIDEO PARITY
VIDEO DATA 10
VTR DATA 11
VTR DATA0
VTR DATA1
VTR DATA2
VTR DATA3
VTR DATA4
VTR DATA5
VTR DATA6
VTR DATA7
VTR PARITY
VE
VS
DDE. 1-18
DDE. 1-17
DDE. 1-16
DDE. 1-15
DDE. 1-14
DDE. 1-13
DDE. 1-12
DDE. 1-11
DDE. 1-10
DDE. 1-8
DDE. 1-7
DPR CK 27 (X)
DPR CK 13.5 (X)
DPR VD
DPR PS1
DPR PS0
DPR CS
DPR STB
DPR DATA7
DPR DATA6
DPR DATA5
DPR DATA4
DPR DATA3
DPR DATA2
DPR DATA1
DPR DATA0
DPR DATA DIR
DPR DATA EN
L PB MODE
L V RESET
L PB RESET
DAP. 100-86
DAP. 100-82
DAP. 100-60
SY. 1-63
SY. 1-64
SY. 1-65
SY. 1-66
SY. 1-67
SY. 1-68
SY. 1-69
SY. 1-70
SY. 1-71
SY. 1-72
SY. 1-73
SY. 1-74
SY. 1-54
SY. 1-53
SY. 1-47
SY. 1-45
DDE. 1-81





DIGITAL PROCESSING



AUDIO (REC) LEVEL DIAGRAM

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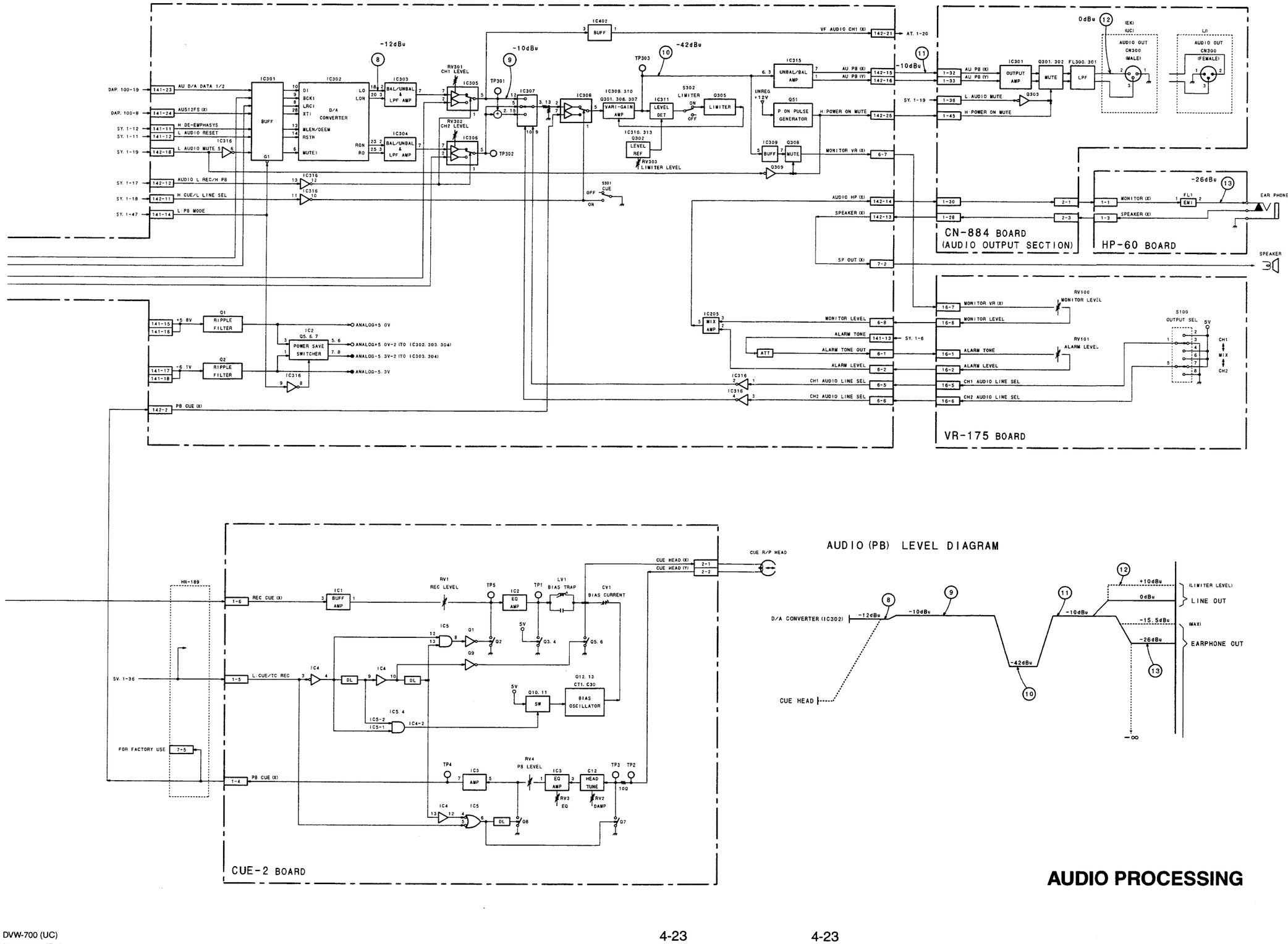
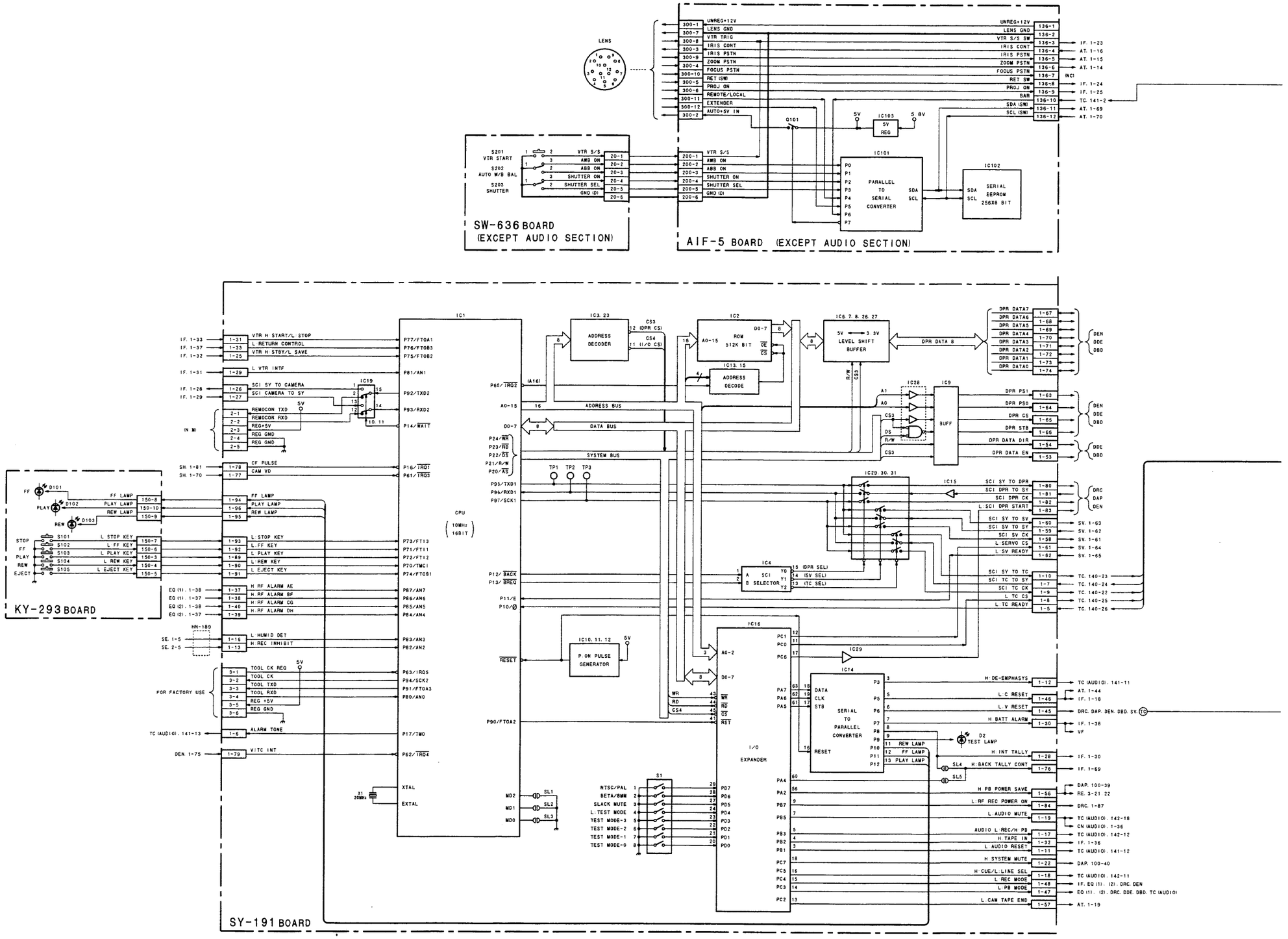
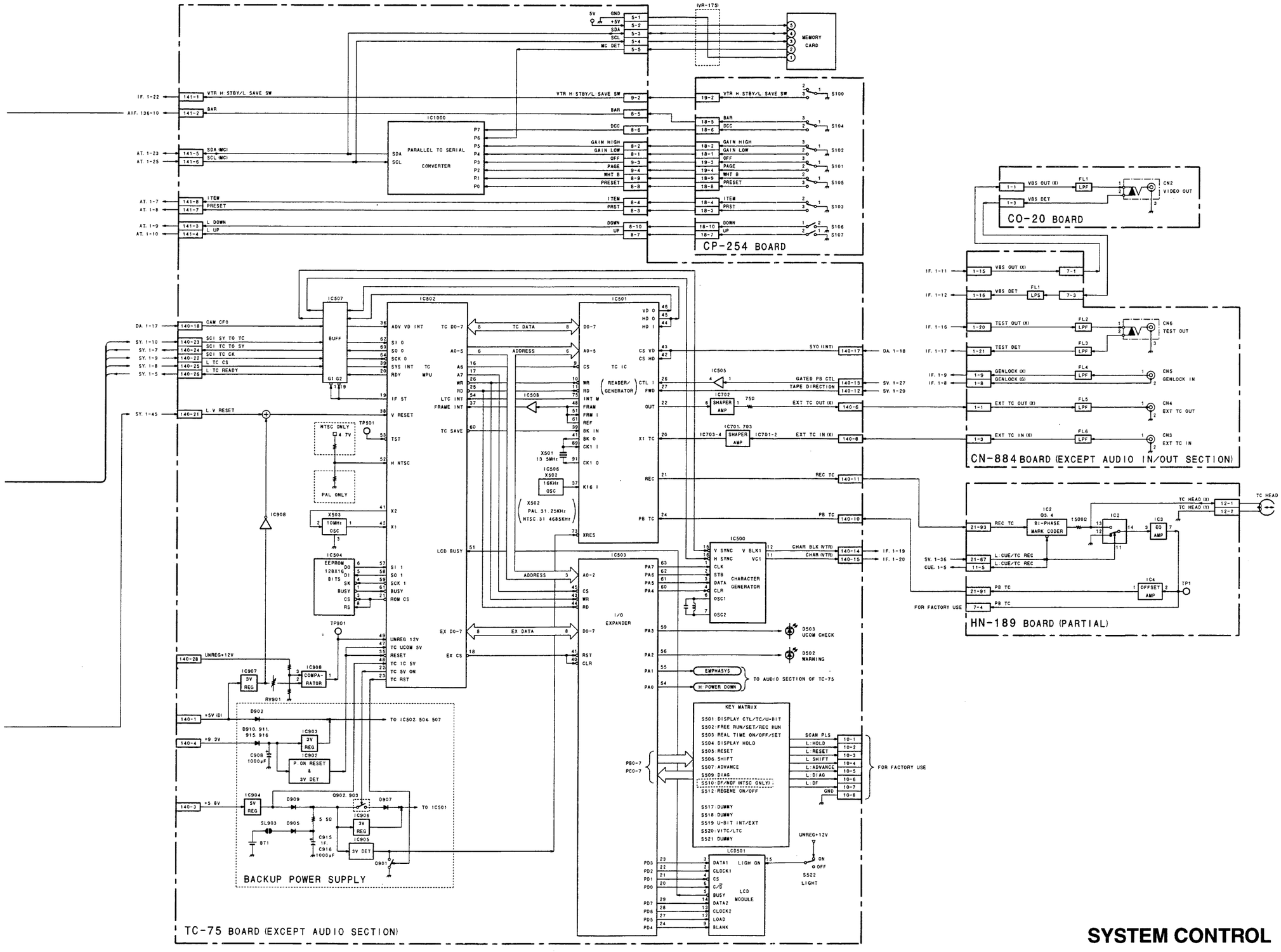
AUDIO PROCESSING Block Diagram



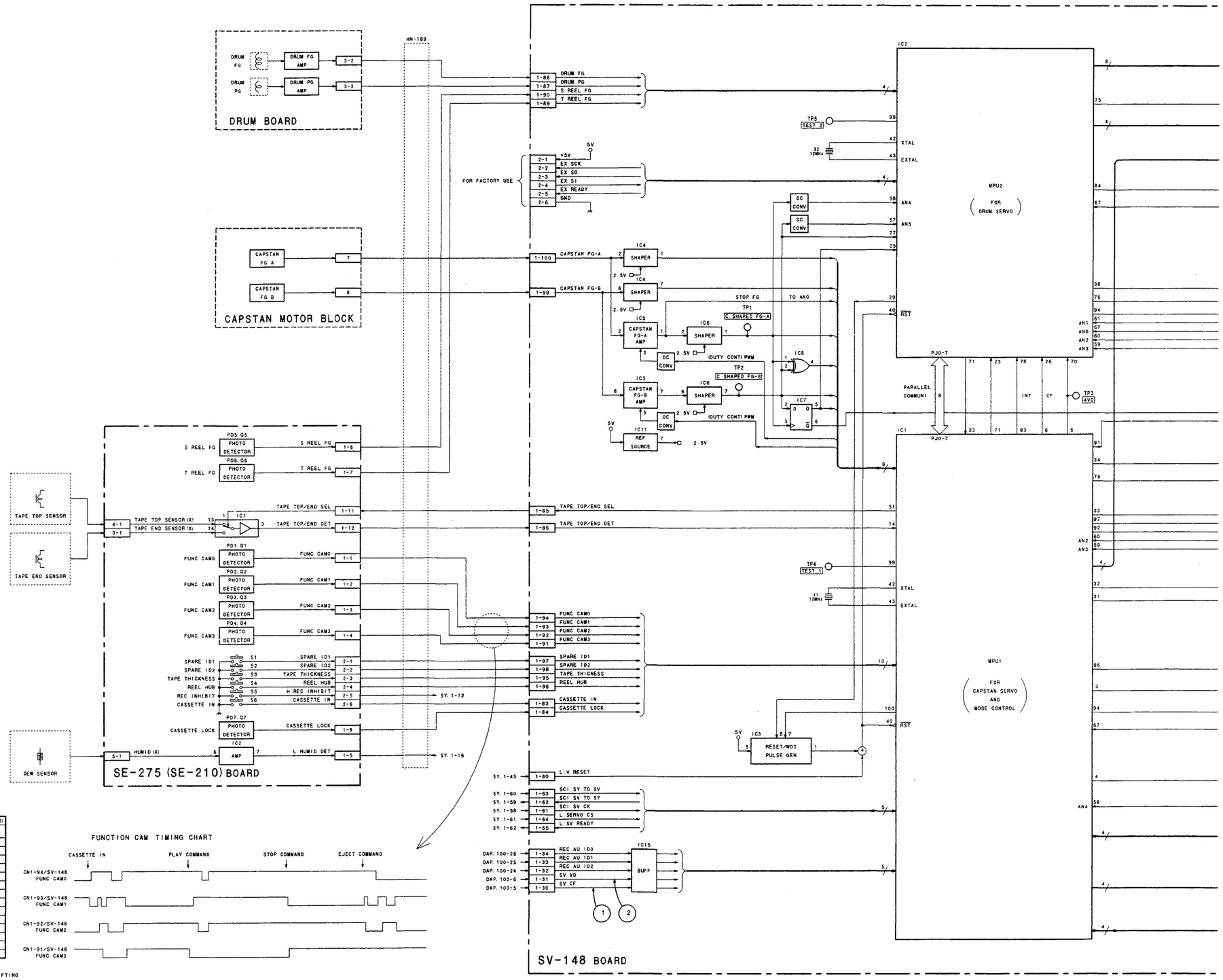
AUDIO (PB) LEVEL DIAGRAM

AUDIO PROCESSING


LENS
SW-636 BOARD
(EXCEPT AUDIO SECTION)
AIF-5 BOARD (EXCEPT AUDIO SECTION)
S201 VTR START
S202 AUTO W/B BAL
S203 SHUTTER
VTR S/S
AWB ON
ABB ON
SHUTTER ON
SHUTTER SEL
GND (D)
UNREG+12V
LENS GND
VTR TRIG
IRIS CONT
IRIS PSTN
ZOOM PSTN
FOCUS PSTN
RET (SW)
PROJ ON
REMOTE/LOCAL
EXTENDER
AUTO+5V IN
Q101
IC103 5V REG
5V
5.8V
IC101
PARALLEL TO SERIAL CONVERTER
IC102
SERIAL EEPROM 256X8 BIT
SDA
SCL
BAR
IF. 1-23
AT. 1-16
AT. 1-15
AT. 1-14
IN(I)
IF. 1-24
IF. 1-25
TC. 141-2
AT. 1-69
AT. 1-70
IC1
IC3. 23 ADDRESS DECODER
IC2 ROM 512K BIT
IC13. 15 ADDRESS DECODE
IC6. 7. 8. 26. 27 5V ⟷ 3.3V LEVEL SHIFT BUFFER
DPR DATA 8
IC28
IC9
BUFF
ADDRESS BUS
DATA BUS
SYSTEM BUS
CPU (10MHz 16BIT)
VTR H START/L STOP
L RETURN CONTROL
VTR H STBY/L SAVE
L VTR INTF
SCI SY TO CAMERA
SCI CAMERA TO SY
REMOCON TXD
REMOCON RXD
REG+5V
REG GND
CF PULSE
CAM VD
FF LAMP
PLAY LAMP
REW LAMP
L STOP KEY
L FF KEY
L PLAY KEY
L REW KEY
L EJECT KEY
H RF ALARM AE
H RF ALARM BF
H RF ALARM CG
H RF ALARM DH
L HUMID DET
H REC INHIBIT
TOOL CK REQ
TOOL CK
TOOL TXD
TOOL RXD
ALARM TONE
VITC INT
FOR FACTORY USE
HN-189
KY-293 BOARD
SY-191 BOARD
IC4 SCI A/B SELECTOR
IC10. 11. 12 P.ON PULSE GENERATOR
IC16 I/O EXPANDER
IC14 SERIAL TO PARALLEL CONVERTER
IC29. 30. 31
IC15
SCI SY TO DPR
SCI DPR TO SY
SCI DPR CK
L SCI DPR START
SCI SY TO SV
SCI SV TO SY
SCI SV CK
L SERVO CS
L SV READY
SCI SY TO TC
SCI TC TO SY
SCI TC CK
L TC CS
L TC READY
H DE-EMPHASYS
L C RESET
L V RESET
H BATT ALARM
H INT TALLY
H BACK TALLY CONT
H PB POWER SAVE
L RF REC POWER ON
L AUDIO MUTE
AUDIO L REC/H PB
H TAPE IN
L AUDIO RESET
H SYSTEM MUTE
H CUE/L LINE SEL
L REC MODE
L PB MODE
L CAM TAPE END
D2 TEST LAMP
NTSC/PAL
BETA/8MM
SLACK MUTE
L TEST MODE
TEST MODE-3
TEST MODE-2
TEST MODE-1
TEST MODE-0
DPR DATA7
DPR DATA6
DPR DATA5
DPR DATA4
DPR DATA3
DPR DATA2
DPR DATA1
DPR DATA0
DPR PS1
DPR PS0
DPR CS
DPR STB
DPR DATA DIR
DPR DATA EN
DEN
DDE
DBD
DRC
DAP



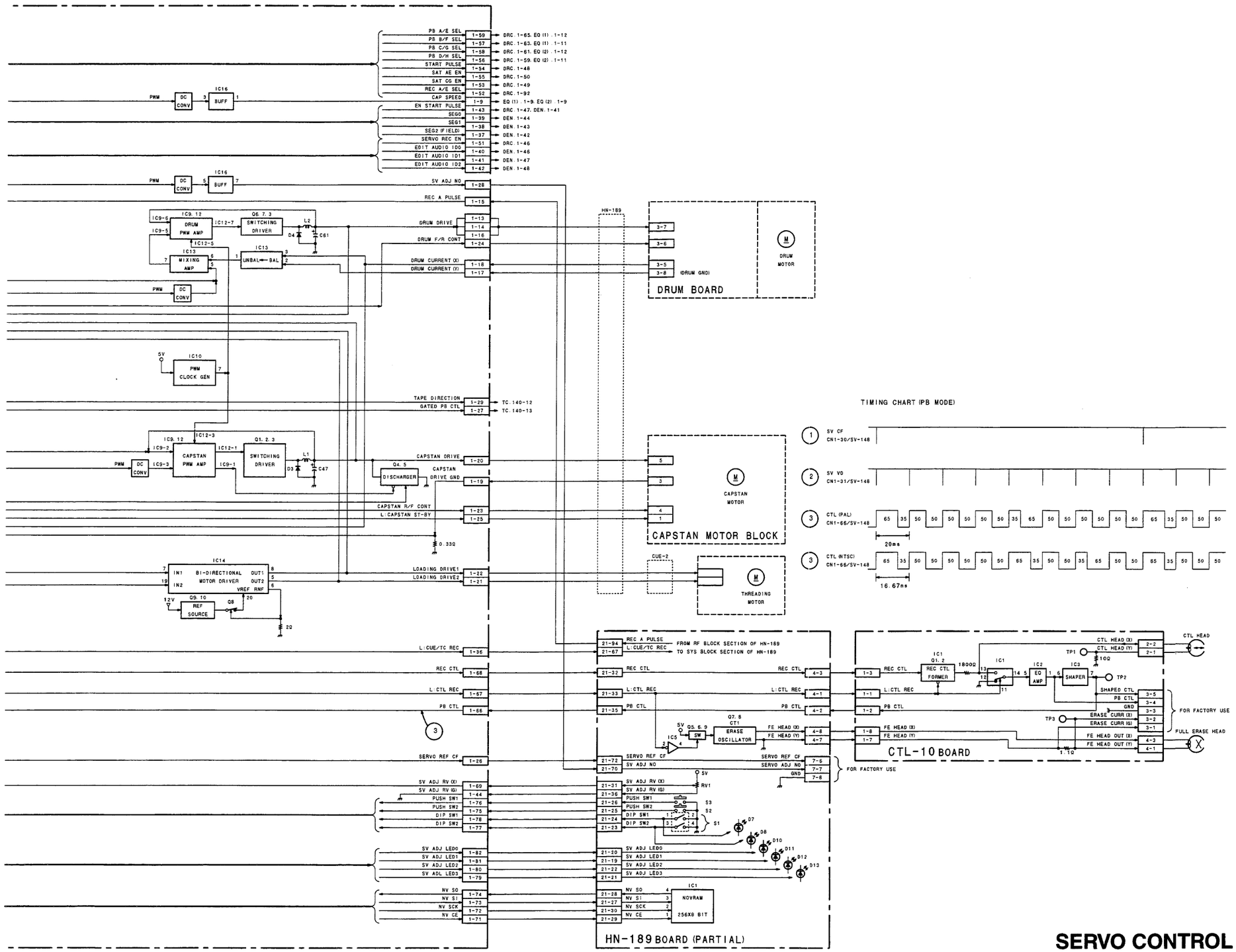
SYSTEM CONTROL



MODE	CODE (FUNC CAM0-3)			
	3	2	1	0
B0	0	1	0	0
EJECT	1	1	0	0
B1	1	1	1	0
ST-BY	1	0	1	0
B2	1	0	0	0
LOAD	1	0	0	1
TEN A	1	0	1	1
B3	1	1	1	1
STOP	1	1	0	1
B4	0	1	0	1
RUN	0	1	1	1
B5	0	0	1	1
CLEAN	0	0	1	0
B6	0	0	0	0

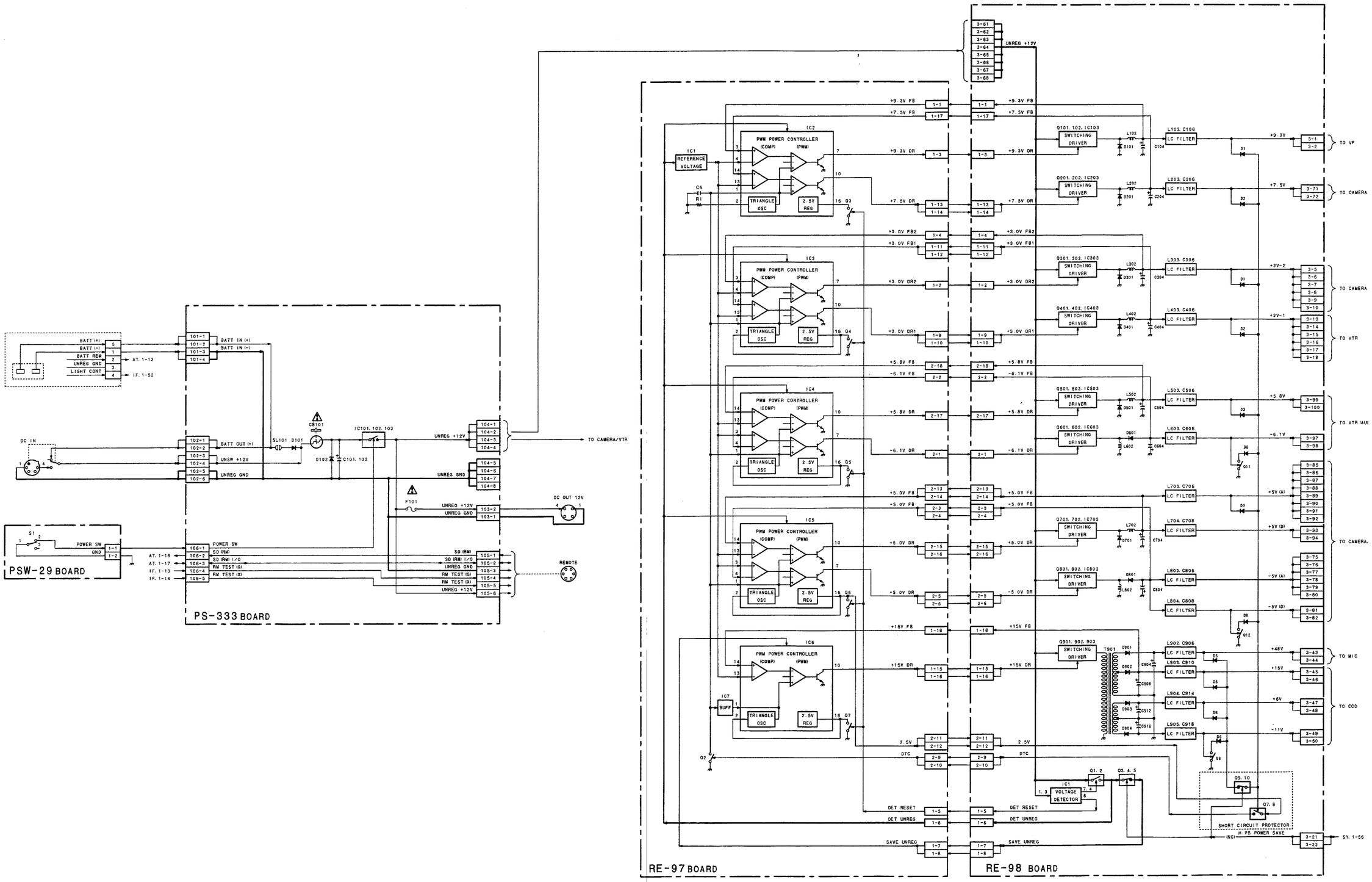
1 HIGH LEVEL
0 LOW LEVEL
B0-B6 UNDER SHIFTING

FUNCTION CAM TIMING CHART



SERVO CONTROL

POWER SUPPLY Block Diagram



4-28

SECTION 5
ELECTRICAL ALIGNMENT

5-1. GENERAL INFORMATION FOR ELECTRICAL ADJUSTMENT

5-1-1. Note for Adjustment

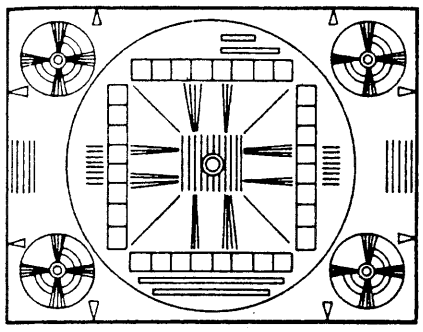
Before adjustment, set the main POWER switch to on and the VTR switch to SAVE, then warm up the camera for about 10 minutes.

Indication at the top right on the viewfinder screen.
In adjustment on the setting menu, a bar sometimes appears at the top right on the viewfinder screen. The bar indicates the current setting state and adjustable range for the selected item.

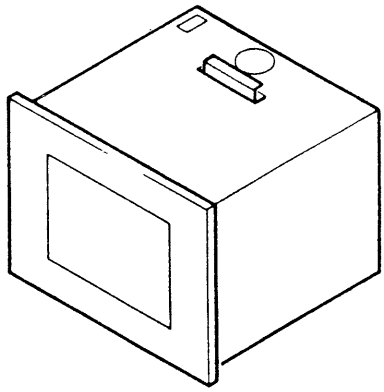
Be sure to set the main POWER switch of the external DC power supply to off before extracting the plug-in board.

5-1-2. Equipment/Fixtures

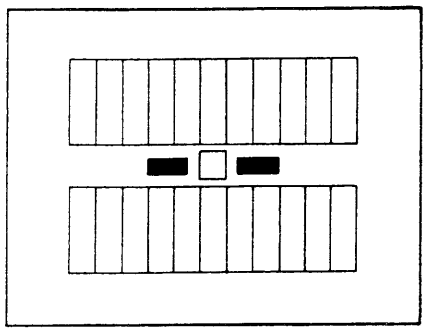
J-6026-100-A	Resolution Chart (4:3)



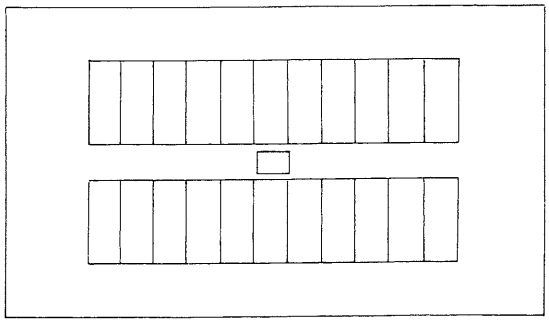
J-6029-140-B	Pattern Box PTB-500 (90 to 240 Vac)



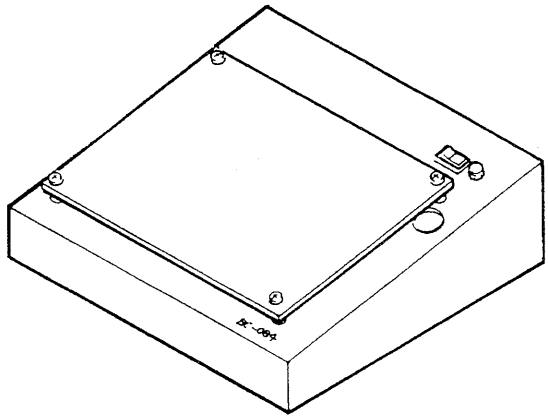
J-6026-130-A	Gray-scale Chart (4:3)



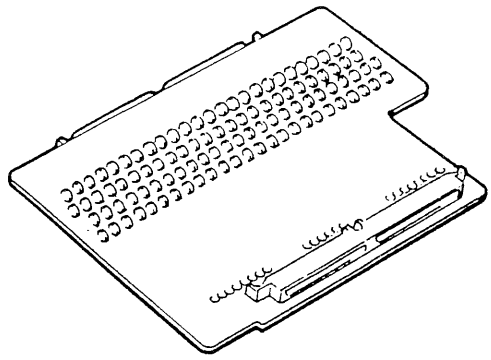
J-6394-080-A	Gray-scale Chart (16:9)



J-6420-840-A	Channel Condition Checker



J-6420-260-A	Extension Board (EX-410)



Equipment	Model or equivalent
AC Adaptor or Battery	Sony AC-550 (for UC) /550CE (for EK)
Oscilloscope	Tektronix 2465B
Audio Analyzer	Tektronix AA501A (OP.02)
Waveform Monitor/Vectorscope	Tektronix 1750 (for NTSC) /1751 (for PAL)
Digital Voltmeter	Advantest TR6845
Audio Level Meter	Hewlett Packard HP 3400A
Black-and-white Monitor (horizontal resolution more than 900 TV lines)	
Color Monitor	Sony BVM-1911 or 2811 (for NTSC) BVM-2011P or 3011P (for PAL)
Low-frequency Oscillator	Hewlett Packard HP 8904
Regulated DC Power Supply (variable voltage 12 V, more than 5 A)	
Alignment Tape	ZR5-1 (for NTSC) /ZR5-1P (for PAL) ZR2-1 (for NTSC) /ZR2-1P (for PAL)
Blank Tape	Digital Betacam cassette

Note "Blank Tape" indicates a cassette tape on which no video/audio signals are recorded.

5-1-3. Test Signals

Alignment Tape ZR5-1 (Part No. 8-960-073-01)
ZR5-1P (Part No. 8-960-073-51)

TIME min.:sec.	CTL	VIDEO	D-AUDIO	CUE	TIME min.:sec.
00 : 00	↑	Color Bars (100%)	1 kHz –20 dB FS	1 kHz 0 VU	00 : 00
				Blank	01 : 25
				1 kHz –20 VU	01 : 30
02 : 00				Blank	02 : 25
				3 kHz –20 VU	02 : 30
			1 kHz 0 dB FS	Blank	02 : 55
				7 kHz –20 VU	03 : 00
				Blank	03 : 25
				10 kHz –20 VU	03 : 30
				Blank	03 : 55
04 : 00				12 kHz –20 VU	04 : 00
				Blank	04 : 25
			–∞ dB FS	90 Hz –20 VU	04 : 30
				Blank	04 : 55
06 : 00					05 : 00
			20 Hz –20 dB FS	Repeat	
08 : 00					
			20 kHz –20 dB FS		
10 : 00					10 : 00
			Repeat	Repeat	
20 : 00	↓				20 : 00

Alignment Tape ZR2-1 (Part No. 8-960-073-11)
ZR2-1P (Part No. 8-960-073-61)

TIME min.:sec.	CTL TRACK	CUE TRACK	VIDEO/AUDIO TRACK
00 : 00 ↑ (7 : 3 PULSE) ↓ 15 : 00	CTL	1 kHz, 0 VU	4 MHz (A CH only)
15 : 00 – 20 : 00	CTL	12 kHz, 0 VU	A, C CH –4 MHz B, D CH –8 MHz
20 : 00 – 25 : 00	CTL	12 kHz, 0 VU	16 MHz (ALL CH)
25 : 00 – 27 : 00	CTL	———	50% FLAT FIELD (ALL CH)

5-1-4. Connection and Initial Settings for Switches

Execute the camera system alignment using the ENG mode in the setting menu. When the setting mode is changed ENG, set switches as follows.

AT-84 board: S1 → ENG

Note Set S1 switch before turning on the power switch.

S2-1 → OFF

S2-2 → OFF

Initial setting for switches

Before performing adjustment, set switches as follows. If the setting of the GAIN switch is changed from the factory-set value, re-set it to its original value by referring to the operation manual.

[External]

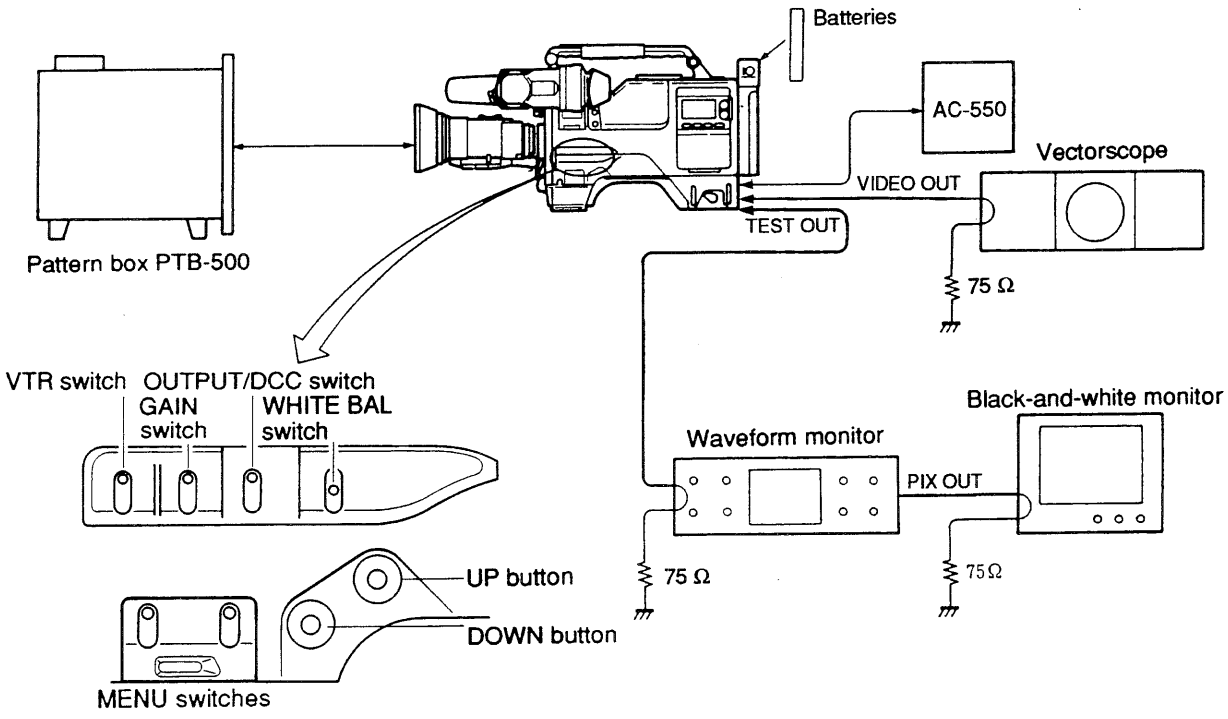
Side panel:	VTR switch	→ STBY
	GAIN switch	→ L (0 dB)
	OUTPUT/DCC switch	→ CAM/OFF
	WHITE BAL switch	→ PRST
	MENU ON/OFF/PAGE switch	→ OFF
	AUDIO IN CH-1 switch	→ REAR
	AUDIO IN CH-2 switch	→ REAR
	AUDIO SELECT CH-1 switch	→ AUTO
	AUDIO SELECT CH-2 switch	→ AUTO
	F-RUN/SET/R-RUN switch	→ R-RUN
	REAL TIME switch	→ OFF
	DISPLAY switch	→ TC
Front panel:	SHUTTER switch	→ OFF
	FILTER selector	→ 1, B
Rear panel:	AUDIO IN CH-1 LINE/MIC switch	→ LINE
	AUDIO IN CH-2 LINE/MIC switch	→ LINE
Lens:	LENS	→ MANU
	IRIS	→ C (CLOSE)

[Internal]

AT-84 board: S3 → Backup

Setting menu:

- MASTER GAIN
  - LOW → 0 dB
  - MID → 9 dB
  - HIGH → 18 dB
- FUNCTION 1/2
  - DETAIL → ON
  - SKIN TONE DETAIL → OFF
  - MATRIX → OFF
  - GAMMA → ON
  - CHROMA → ON
  - TEST SAW → OFF
- FUNCTION 2/2
  - GENLOCK → ON
  - CAM RET → OFF
  - FILTER INH → ON
- TEST OUT
  - ENC
- LEVEL 3/9
  - KNEE → ON
  - WHITE CLIP → ON
- LEVEL 4/9
  - I → ON (for NTSC)
  - Q → ON (for NTSC)
  - R-Y → ON (for PAL)
  - B-Y → ON (for PAL)



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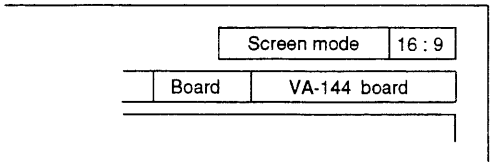
Screen mode change

Sets the screen mode as follows before performing the adjustment of the each page.

1. Setting menu
   PAGE: WIDE SCREEN
   ITEM: 16:9/4:3 MODE

2. Sets the screen mode as written in the each page. When the screen mode column is blank, both "16:9" and "4:3" modes are acceptable for adjustment.



After adjustments are completed, return each switch to the former state.

5-1-5. Adjustment after Replacement of Boards and/or Blocks

When the board and/or block is replaced, adjust items as follows.

Boards/ Block names	Adjustments
CCD block	Refer to the maintenance manual part 2.
Viewfinder	Viewfinder System Adjustment
Drum	Automatic Servo Adjustment, Video System Adjustment (Equalizer)
TC Head	Audio System Adjustment
AD-97 board	Refer to the maintenance manual part 2.
AIF-5 board	Refer to the maintenance manual part 2.
AT-84 board	Refer to the maintenance manual part 2.
CUE-2 board	Audio System Adjustment
DA-76A board	ENC Gain Adjustment, ENC Level Adjustment
EQ-48 board	Video System Adjustment (Equalizer)
HN-189 board	Refer to the maintenance manual part 2.
SH-47 board	Refer to the maintenance manual part 2.
TC-75 board	Automatic Servo Adjustment, Video System Adjustment (Equalizer)
VA-144 board	Refer to the maintenance manual part 2.
Other boards	No adjustment is reguired after board replacement.

5-2. CAMERA SYSTEM ADJUSTMENT

5-2-1. ENC Gain Adjustment

• Setting

Equipment	Waveform monitor	Board	

• Preparation

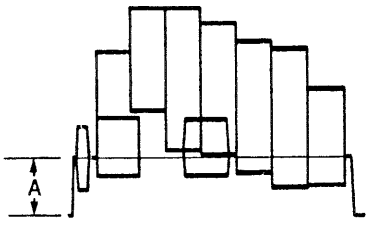
Connect a waveform monitor to the TEST OUT connector.

• Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector

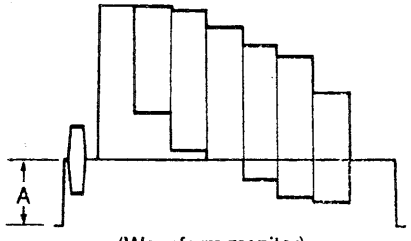
1. Set the OUTPUT/DCC switch on the side panel to BARS.
2. Set the MENU switch on the side panel to ON.
3. On the setting menu, set PAGE and ITEM as follows:
   PAGE: D/A GAIN
   ITEM: ENC GAIN
4. Adjust level A for the following specification by pressing the UP/DOWN button on the side panel.
   A = 40 ±2 IRE (for NTSC model)
   A = 300 ±10 mV (for PAL model)

NTSC model



(Waveform monitor)

PAL model



(Waveform monitor)

5-2-2. ENC Level Adjustment

• Setting

Equipment	Waveform monitor	Board	

• Preparation

Connect a waveform monitor to the TEST OUT connector.

• Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector

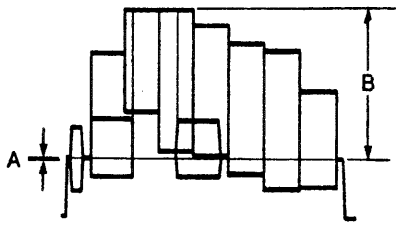
1. Set the OUTPUT/DCC switch on the side panel to BARS.
2. Set the MENU switch on the side panel to ON.

NTSC model only

3. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 4/9
   ITEM: ENC SETUP LEVEL
4. Adjust the level A to meet the following specification by pressing the UP/DOWN button on the side panel.
   A = 7.5 IRE

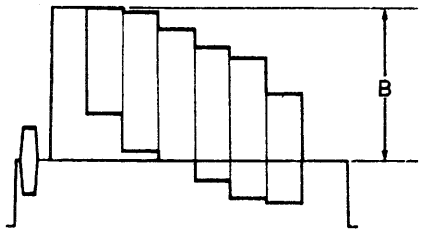
5. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 4/9
   ITEM: ENC Y LEVEL
6. Adjust the level B to meet the following specification by pressing the UP/DOWN button on the side panel.
   B = 100 ±2 IRE (for NTSC model)
   B = 700 ±10 mV (for PAL model)

NTSC model



(Waveform monitor)

PAL model



(Waveform monitor)

5-2-3. VA Gain Adjustment

• Setting

Equipment	Waveform monitor	Board	VA-144 board

• Note

Use a reflective chart in this adjustment, if possible. Adjust the color temperature to 3200k exactly. If a pattern box is used, check its state before use.
Never change the setting of the following variable capacitors. These capacitors are difficult to adjust.
VA-144 board: ⊘CT101, ⊘CT201, ⊘CT301
Set the luminous intensity of the chart to 2000 lx.

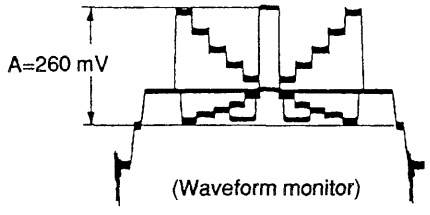
• Preparation

Connect a waveform monitor to the TEST OUT connector. Shoot the gray-scale chart (16:9) as large as possible on the screen. Set the WHITE BAL switch to PRST.

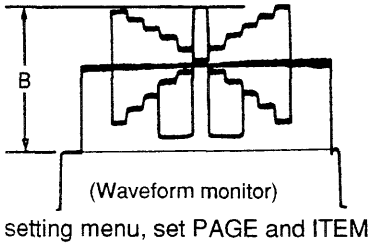
• Adjustment procedure

Adjustment point: ⊘RV101 (R GAIN); VA-144 board
⊘RV201 (G GAIN); VA-144 board
⊘RV301 (B GAIN); VA-144 board
Measurement point: TEST OUT connector
Object: Gray-scale chart (16:9)

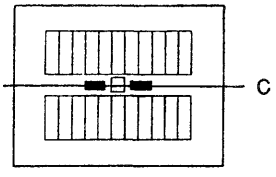
1. Set the OUTPUT/DCC switch on the side panel to CAM/ON.
2. Set the AUTO W/B BAL switch on the front panel to BLK to perform the automatic black balance adjustment.
3. Connect the oscilloscope to CN1-48 pin on the VA-144 board. Adjust this iris control so that the level A is 260 mV.



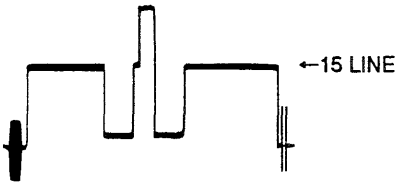
4. Set the MENU switch on the side panel to ON.
5. On the setting menu, set PAGE and ITEM as follows:
   PAGE: TEST OUT
   ITEM: G
6. Adjust the level B for the following specification by using variable resistor ⊘RV201 (G GAIN);VA-144 board.
   B = 100 ± 2 IRE (for NTSC model)
   B = 700 ± 10 mV (for PAL model)



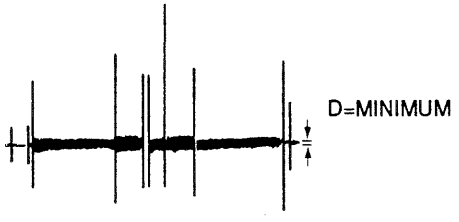
7. On the setting menu, set PAGE and ITEM as follows:
   PAGE: TEST OUT
   ITEM: ENC
8. On the setting menu, set PAGE and ITEM as follows:
   PAGE: FUNCTION 1/2
   ITEM: GAMMA → OFF
9. Select 15 lines at portion C by using the waveform monitor.
10. Set the waveform monitor to the CHROMA mode.
11. Minimize carrier leak D by using for variable resistor ⊘RV101 (R GAIN) and ⊘RV301 (B GAIN) on the VA-144 board.
12. On the setting menu, set PAGE and ITEM as follows:
    PAGE: FUNCTION 1/2
    ITEM: GAMMA → ON



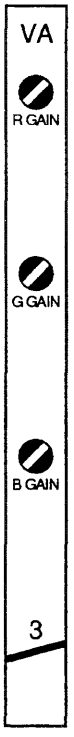
(Monitor screen)



(Waveform monitor)



(Waveform monitor)



VA-144 BOARD
(PANEL SIDE)

5-2-4. White Shading Adjustment

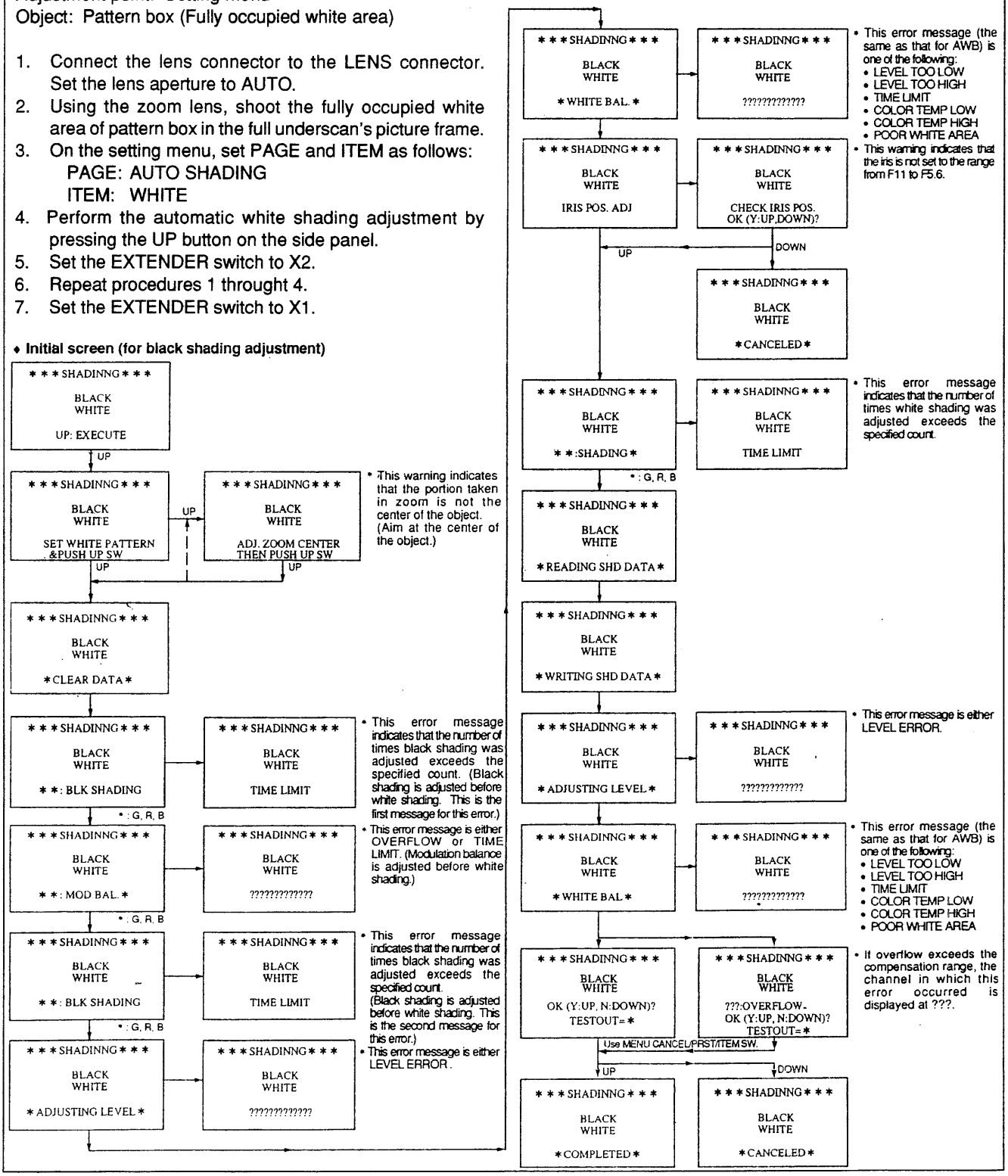
If the white shading appears, it is considered that several conditions such as an uneven white pattern luminance, lens iris and lens zoom are not good .
When the error occurs, first check whether the above conditions are good or not looking in the viewfinder screen.

- Adjustment procedure

Adjustment point: Setting menu
Object: Pattern box (Fully occupied white area)

1. Connect the lens connector to the LENS connector. Set the lens aperture to AUTO.
2. Using the zoom lens, shoot the fully occupied white area of pattern box in the full underscan's picture frame.
3. On the setting menu, set PAGE and ITEM as follows:
   PAGE: AUTO SHADING
   ITEM: WHITE
4. Perform the automatic white shading adjustment by pressing the UP button on the side panel.
5. Set the EXTENDER switch to X2.
6. Repeat procedures 1 throught 4.
7. Set the EXTENDER switch to X1.

♦ **Initial screen (for black shading adjustment)**


* * * SHADINNG * * *
BLACK
WHITE
UP: EXECUTE
UP
SET WHITE PATTERN &PUSH UP SW
ADJ. ZOOM CENTER THEN PUSH UP SW
• This warning indicates that the portion taken in zoom is not the center of the object. (Aim at the center of the object.)
* CLEAR DATA *
* *: BLK SHADING
TIME LIMIT
• This error message indicates that the number of times black shading was adjusted exceeds the specified count. (Black shading is adjusted before white shading. This is the first message for this error.)
• : G, R, B
* *: MOD BAL. *
?????????????
• This error message is either OVERFLOW or TIME LIMIT. (Modulation balance is adjusted before white shading.)
• This error message indicates that the number of times black shading was adjusted exceeds the specified count. (Black shading is adjusted before white shading. This is the second message for this error.)
* ADJUSTING LEVEL *
• This error message is either LEVEL ERROR.
* WHITE BAL. *
IRIS POS. ADJ
CHECK IRIS POS. OK (Y:UP,DOWN)?
DOWN
* CANCELED *
* *:SHADING *
• This error message indicates that the number of times white shading was adjusted exceeds the specified count.
* READING SHD DATA *
* WRITING SHD DATA *
• This error message is either LEVEL ERROR.
• This error message (the same as that for AWB) is one of the following:
• LEVEL TOO LOW
• LEVEL TOO HIGH
• TIME LIMIT
• COLOR TEMP LOW
• COLOR TEMP HIGH
• POOR WHITE AREA
• This warning indicates that the iris is not set to the range from F11 to F5.6.
OK (Y:UP, N:DOWN)?
TESTOUT= *
???:OVERFLOW-
OK (Y:UP, N:DOWN)?
TESTOUT= *
• If overflow exceeds the compensation range, the channel in which this error occurred is displayed at ???.
Use MENU CANCEL/PRST/ITEM SW.
* COMPLETED *

5-2-5. Gamma Correction Adjustment

- Setting

Equipment	Waveform monitor, Vectorscope	Board	

- Preparation

Connect a waveform monitor to the TEST OUT connector,
and connect a vectorscope to the VIDEO OUT connector.
Shoot a gray-scale chart in the full underscan's picture frame.

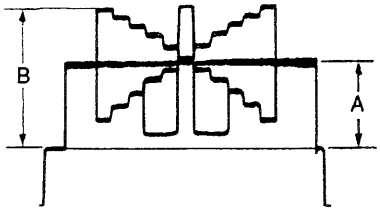
- Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector
Object: Gray-scale chart
Lens IRIS: Adjust the white level as follow:
B=100 ±2 IRE (for NTSC model)
B=700 ±10 mV (for PAL model)

1. Set the OUTPUT/DCC switch on the side panel to CAM/ON.
2. Set the MENU switch on the side panel to ON.
3. On the setting menu set PAGE and ITEM as follows in the specified order.

	PAGE	ITEM
①	LEVEL 5/9	TEST OUT → G
②	LEVEL 3/9	MASTER GAMMA

4. Set the setting menu to setting ② described above. By pressing the UP/Down button, set the level A as follow:
A = 63 ±2 IRE (for NTSC model)
A = 430 ±14 mV (for PAL model)

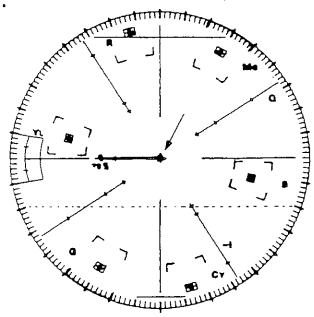


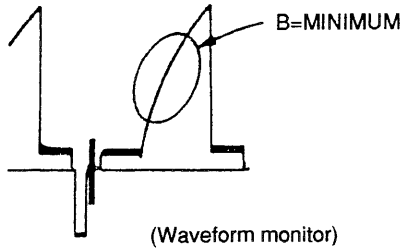
(Waveform monitor)

5. On the setting menu set PAGE and ITEM as follows in the specified order.

	PAGE	ITEM
③	LEVEL 5/9	TEST OUT → ENC
④	FUNCTION 1/2	TEST SAW ON
⑤	LEVEL 5/9	R GAMMA
⑥	LEVEL 5/9	B GAMMA

6. Under setting ⑤, adjust the dot at the near center of the vectorscope by pressing the UP/DOWN button on the side panel.
7. Under setting ⑥, adjust the dot at the near center of the vectorscope by pressing the UP/DOWN button on the side panel.
8. Repeat steps 6 and 7 alternately.
9. Make sure that the carrier leak at portion B is not ofserved.





(Waveform monitor)

10. On the setting menu, set PAGE and ITEM as follows:
PAGE:FUNCTION 1/2
ITEM: TEST SAW → OFF

5-2-6. Black Set Adjustment

• Setting

Equipment	Waveform monitor	Board	

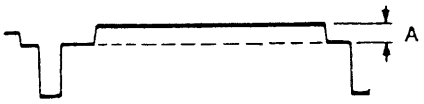
• Preparation

Connect a waveform monitor to the TEST OUT connector.

• Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector
Lens IRIS: C (Close)

1. Set the OUTPUT/DCC switch on the side panel to CAM/ON.
2. Set the MENU switch on the side panel to ON.
3. On the setting menu, set PAGE and ITEM as follows:
   PAGE: TEST OUT
   ITEM: G
4. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 3/9
   ITEM: MASTER BLACK
5. Adjust the level A to meet the following specification by pressing the UP/DOWN button on the side panel.
   A = 3 ±2 IRE (for NTSC model)
   A = 20 ±14 mV (for PAL model)
6. On the setting menu, set PAGE and ITEM as follows:
   PAGE: TEST OUT
   ITEM: ENC
7. Set the MENU switch on the side panel to OFF.
8. Set the AUTO W/B BAL switch on the front panel to BLK, to perform the AUTO BLACK BAL adjustment.



(Waveform monitor)

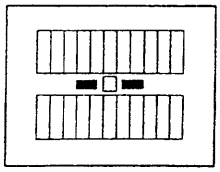
5-2-7. Flare Adjustment

- Setting

Equipment	Waveform monitor	Board	

- Preparation

Connect a waveform monitor to the TEST OUT connector.
Shoot a gray-scale chart in the full underscan's picture frame .

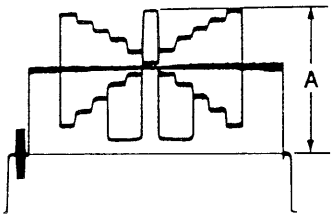


Monitor screen

- Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector
Object: Gray-scale chart (16:9)
lens IRIS: Adjust the white level as follow:
A = 100 ±2 IRE (for NTSC model)
A = 700 ±10 mV (for PAL model)

1. Set the OUTPUT/DCC switch on the side panel to CAM/ON.
2. Open the lens iris by one step from the reference setting (corresponding to A).

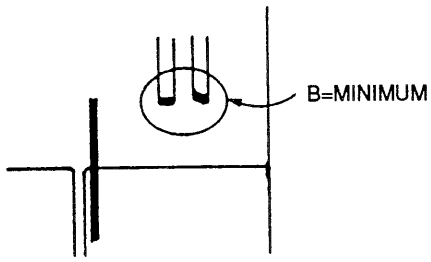


(Waveform monitor)

3. Set the MENU switch on the side panel to ON.
4. Make sure that the value of PAGE: LEVEL 5/9, ITEM: G FLARE is 0 (zero) by using the setting menu.
5. Select the 15 lines at the center of the monitor screen by the using the 15 LINE select and variable control on the waveform monitor.
6. On the setting menu set PAGE and ITEM as follows in the specified order.

	PAGE	ITEM
①	LEVEL 5/9	R FLARE
②	LEVEL 5/9	B FLARE

7. Under setting ①, minimize the carrier leak at portion B by pressing the UP/DOWN button on the side panel.
8. Under setting ②, minimize the carrier leak at portion B by pressing the UP/DOWN button on the side panel.



(Waveform monitor)

9. Repeat steps 6 and 7 alternately.

5-2-8. Manual Knee and White Clip Adjustment

• Setting

Equipment	Waveform monitor	Board	

• Preparation

Connect a waveform monitor to the TEST OUT connector.

• Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector

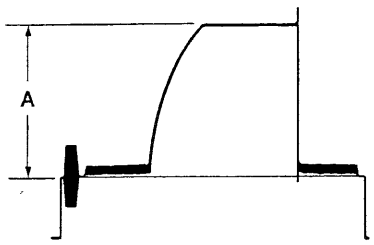
1. Set the OUTPUT/DCC switch on the side panel to CAM/DCC OFF.
2. Set the WHITE BAL switch on the side panel to PRST.
3. Set the GAIN switch on the side panel to M (9 dB).
4. Set the MENU switch on the side panel to ON.
5. On the setting menu, set PAGE and ITEM as follows in the specified order:

	PAGE	ITEM
①	FUNCTION 1/2	TEST SAW → ON
②	LEVEL 3/9	WHITE CLIP → OFF
③		KNEE SLOPE
④		KNEE POINT

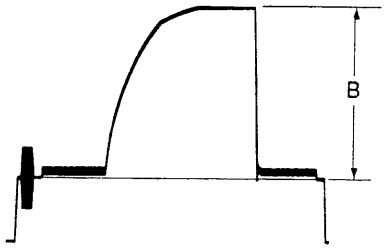
6. Under setting ③, minimize the knee slope by pressing the UP/DOWN button on the side panel (fully UP side).
7. Under setting ④, set the level of the knee point A to meet the following specification by pressing the UP/DOWN button on the side panel.
   A = 98 ±2 IRE (for NTSC model)
   A = 686 ±10 mV (for PAL model)
8. Under setting ③, set the level of the knee slope B to meet the following specification by pressing the UP/DOWN button on the side panel.
   B = 109 ±2 IRE (for NTSC model)
   B = 763 ±10 mV (for PAL model)
9. Set the GAIN switch on the side panel to H (18 dB).
10. On the setting menu, set PAGE and ITEM as follows in the specified order:

	PAGE	ITEM
⑤	LEVEL 3/9	WHITE CLIP → ON
⑥		WHITE CLIP LEVEL

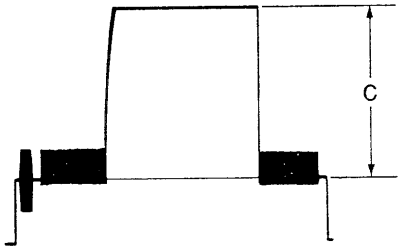
11. Under setting ⑥, set the white clip level C to meet the following specification by pressing the UP/DOWN button on the side panel.
    C = 109 ±2 IRE (for NTSC model)
    C = 763 ±10 mV (for PAL model)
12. On the setting menu, set PAGE and ITEM as follows:
    PAGE: FUNCTION 1/2
    ITEM: TEST SAW → OFF



(Waveform monitor)



(Waveform monitor)



(Waveform monitor)

• Note

The values used in the above adjustment are for the conditions that the white clip level is set to 109 IRE. When the white clip level is set to a value other than 109 IRE, use the following table to set the levels of the knee point and knee slope. *(109 IRE→763 mV: PAL model)

	WHITE CLIP LEVEL (Unit: IRE/mV)			
	109/763	107/749	105/735	103/721
KNEE POINT	98/686	98/686	96/672	96/672
KNEE SLOPE	109/763	107/750	107/750	107/750
WHITE CLIP	109/763	107/750	105/735	103/721

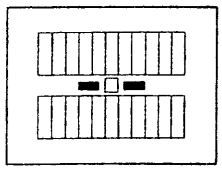
5-2-9. Crispening Adjustment

• Setting

Equipment	Waveform monitor	Board	

• Preparation

Connect a waveform monitor to the TEST OUT connector.
On the setting menu, set PAGE and ITEM as follows:
PAGE: FUNCTION 1/2
ITEM: DETAIL → ON
Then, set PAGE to LEVEL 1/9 and ITEM to DETAIL LEVEL.
Push up the MENU switch to CANCEL/PRST side four times to preset the data.
Shoot a gray-scale chart in the full underscan's picture frame by using the zoom lens.

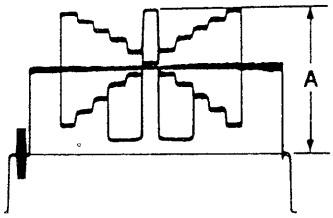


Monitor screen

• Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector
Object: Gray-scale chart

1. While shooting the gray-scale chart, adjust the lens iris so that the level A is set as follow:
   A = 100 ±2 IRE (for NTSC model)
   A = 700 ±10 mV (for PAL model)



(Waveform monitor)

2. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 1/9 <4:3 MODE>
   ITEM: CRISPENING
3. Reduce the noise on the screen to a permissible level by pressing the UP/DOWN button on the side panel.

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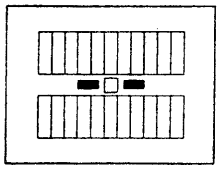
5-2-10. Level Dependent Adjustment

• Setting

Equipment	Waveform monitor	Board	

• Preparation

Connect a waveform monitor to the TEST OUT connector.
On the setting menu, set PAGE and ITEM as follows:
PAGE: FUNCTION 1/2
ITEM: DETAIL → ON
PAGE: TEST OUT
ITEM: ENC
Set the OUTPUT/DCC switch on the side panel to CAM/ON.
Shoot a gray-scale chart in the full underscan's picture frame by using the zoom lens.

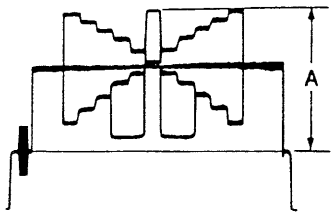


Monitor screen

• Adjustment procedure

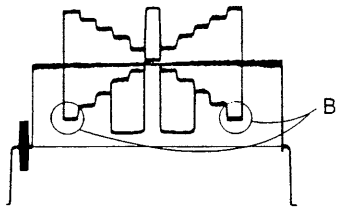
Adjustment point: Setting menu
Measurement point: TEST OUT connector
Object: Gray-scale chart

1. While shooting the gray-scale chart, adjust the lens iris so that the level A is set as follow:
   A = 100 ±2 IRE (for NTSC model)
   A = 700 ±10 mV (for PAL model)



(Waveform monitor)

2. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 1/9
   ITEM: LEVEL DEPEND
3. Eliminate the detail signal from portion B by pressing the UP/DOWN button on the side panel.



(Waveform monitor)

• Note

After this adjustment, be sure to perform 5-2-11. H/V ratio adjustment, and 5-2-12. Detail level adjustment, in that order.

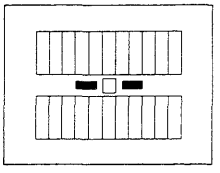
5-2-11. H/V Ratio Adjustment

- Setting

Equipment	Waveform monitor	Board	

- Preparation

Connect a waveform monitor to the TEST OUT connector.
On the setting menu, set PAGE and ITEM as follows:
PAGE: FUNCTION 1/2
ITEM: DETAIL → ON
PAGE: TEST OUT
ITEM: ENC
Shoot a gray-scale chart in the full underscan's picture frame by using the zoom lens.

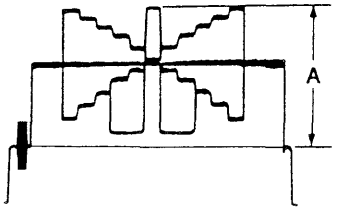


Monitor screen

- Adjustment procedure

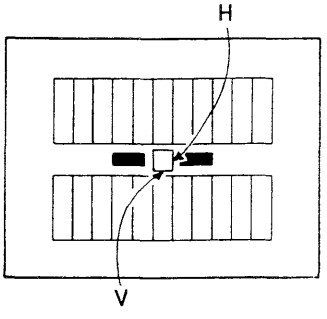
Adjustment point: Setting menu
Measurement point: TEST OUT connector
Object: Gray-scale chart

1. While shooting the gray-scale chart, adjust the lens iris so that the level A is set as follow:
   A = 100 ±2 IRE (for NTSC model)
   A = 700 ±10 mV (for PAL model)



(Waveform monitor)

2. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 1/9
   ITEM: V DTL LEVEL
3. Adjust the H and V detail amounts be added are equivalent by pressing the UP and/or DOWN button.



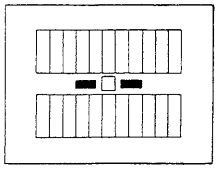
5-2-12. Detail Level Adjustment

- Setting

Equipment	Waveform monitor	Board	

- Preparation

Connect a waveform monitor to the TEST OUT connector.
On the setting menu, set PAGE and ITEM as follows:
PAGE: FUNCTION 1/2
ITEM: DETAIL → ON
PAGE: TEST OUT
ITEM: ENC
Shoot a gray-scale chart in the full underscan's picture frame by using the zoom lens.

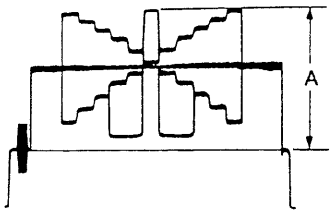


Monitor screen

- Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector
Object: Gray-scale chart

1. While shooting the gray-scale chart, adjust the lens iris so that the level A is set as follow:
   A = 80 ±2 IRE (for NTSC model)
   A = 560 ±10 mV (for PAL model)



(Waveform monitor)

2. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 1/9
   ITEM: V DTL LEVEL
3. Set the desired level of the detail signal added to each step in the gray-scale chart by pressing the UP/DOWN button on the side panel.

5-2-13. Skin Tone Adjustment

• Setting

Equipment	Color monitor, Viewfinder or Vectorscope	Board	

• Preparation

Shoot a person's face.
On the setting menu, set PAGE and ITEM as follows.
PAGE: FUNCTION 1/2
ITEM: SKIN TONE DTL → ON

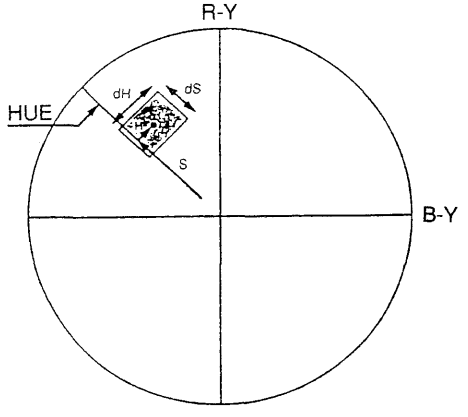
• Adjustment procedure

1. On the setting menu, set PAGE and ITEM as follows.
   PAGE: LEVEL 2/9
   ITEM: SKIN TONE IND. → ON
2. Adjustment point: Setting menu
   PAGE: LEVEL 2/9
   ITEM: SKIN TONE HUE: Adjust the picture hue
   HUE CENTER H
   HUE RANGE dH

   SAT CENTER S } Component in the saturation
   SAT RANGE dS } direction

   On the setting menu, set PAGE and ITEM as follows.
   PAGE: LEVEL 2/9
   ITEM: SKIN TONE DTL
   Adjust the amount of the Skin Detail signal using the UP and/or DOWN buttons.

   For reference
   The effective area of the Skin Detail signal appears as a zebra pattern for Skin Detail on the VF screen. Set the desired level.
   The effective area of the Skin Detail signal output as a monochrome signal from the TEST OUT/VIDEO OUT connectors. Set the desired level using the Color Monitor or Vectorscope. (The component of the Chroma signal in the setting area disappears on the Vectorscope screen.)



(Vectorscope Screen)

3. On the setting menu, set PAGE and ITEM as follows.
   PAGE: LEVEL 2/9
   ITEM: SKIN TONE IND. → OFF
   PAGE: FUNCTION 1/2
   ITEM: SKIN TONE DTL → OFF

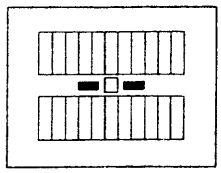
5-2-14. Zebra Adjustment

- Setting

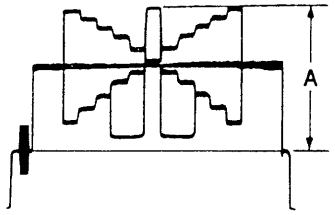
Equipment	Waveform monitor	Board	

- Preparation

Set the ZEBRA switch on the viewfinder to ON.
On the setting menu, set PAGE and ITEM as follows:
PAGE: TEST OUT
ITEM: ENC
Shoot a gray-scale chart in the full underscan's picture frame by using the zoom lens.
Adjust the lens iris so that the level A is set as follow:
A = 100 ±2 IRE (for NTSC model)
A = 700 ±10 mV (for PAL model)



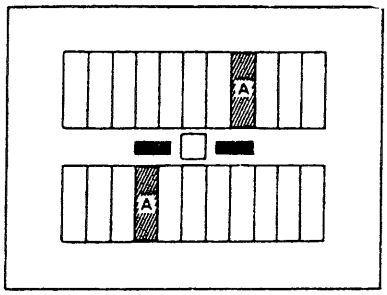
Monitor screen



Waveform monitor

- Adjustment procedure

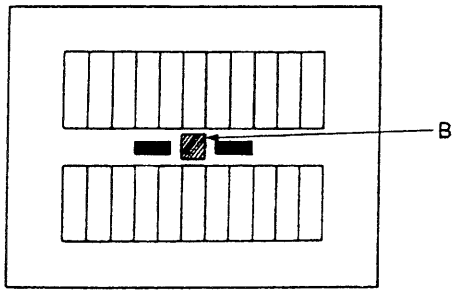
1. Adjustment point: Setting menu
PAGE: LEVEL 3/9
ITEM: ZEBRA 1 DETECT
Measurement point: Viewfinder
Specification: Set the condition that stripes appear at the center of portions A on the viewfinder screen, by pressing the UP/DOWN button on the side panel.



(Viewfinder screen)

2. On the setting menu, set PAGE and ITEM as follows:
PAGE: LEVEL 3/9
ITEM: ZEBRA2 → ON

3. On the setting menu, set PAGE and ITEM as follows:
PAGE: LEVEL 3/9
ITEM: ZEBRA2 DETECT
Specification: Set the condition that stripes appear at the center of portion B on the viewfinder screen, by pressing the UP/DOWN button on the side panel.



(Viewfinder screen)

4. On the setting menu, set PAGE and ITEM as follows:
PAGE: LEVEL 3/9
ITEM: ZEBRA2 → OFF

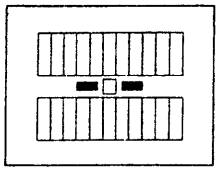
5-2-15. Automatic Iris Adjustment

• Setting

Equipment	Waveform monitor	Board	

• Preparation

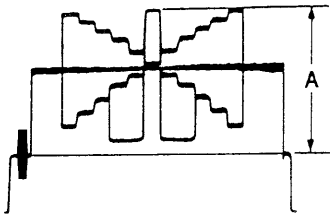
Set the OUTPUT/DCC switch on the side panel to CAM/ON.
On the setting menu, set PAGE and ITEM as follows:
PAGE: TEST OUT
ITEM: ENC
Set the lens AUTO/MANU switch to AUTO.
Shoot a gray-scale chart in the full underscan's picture frame by using the zoom lens.



Monitor screen

• Adjustment procedure

1. Adjustment point: Setting menu
   PAGE: LEVEL 9/9
   ITEM: IRIS SET
   Specification: Adjust the lens iris so that the level A is set as follow:
   A = 100 ±2 IRE (for NTSC model)
   A = 700 ±10 mV (for PAL model)

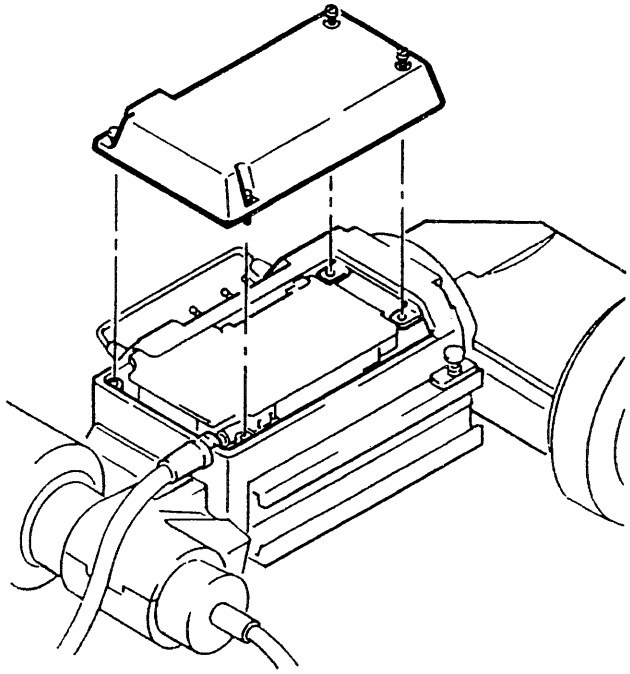


2. Adjustment point: Setting menu
   PAGE: LEVEL 9/9
   ITEM: IRIS MODE
   Measurement point: TEST OUT connector
   Specification: Set the automatic iris operation mode depending on the application. Press the DOWN button to set the mode to that in which the iris operates according to the peak-to-peak level of the video signal. Press the UP button to set the mode to that in which the iris operates according to the average level of the video signal.
3. Set the lens AUTO/MANU switch to MANU.
4. Set the OUTPUT/DCC switch on the side panel to CAM/OFF.
5. On the setting menu, set PAGE and ITEM as follows:
   PAGE: FUNCTION 2/2
   ITEM: FILTER INH → OFF
6. Set S1 on the AT-84 board to USER.

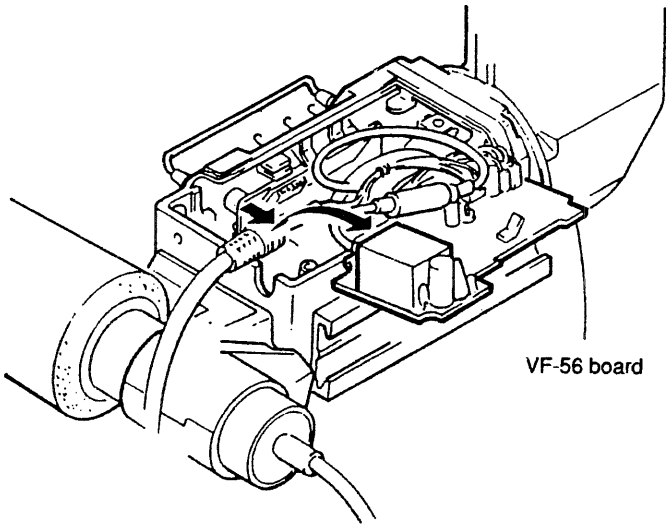
5-2-16. Viewfinder System Adjustment

This adjustment should be performed after the camera is adjusted completely.

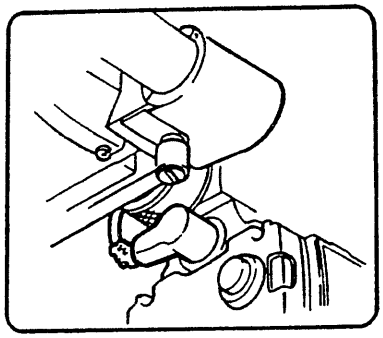
1. Turn OFF the main POWER switch (side panel) before adjustment.
2. Remove the viewfinder from the camera, then remove the VF cover.



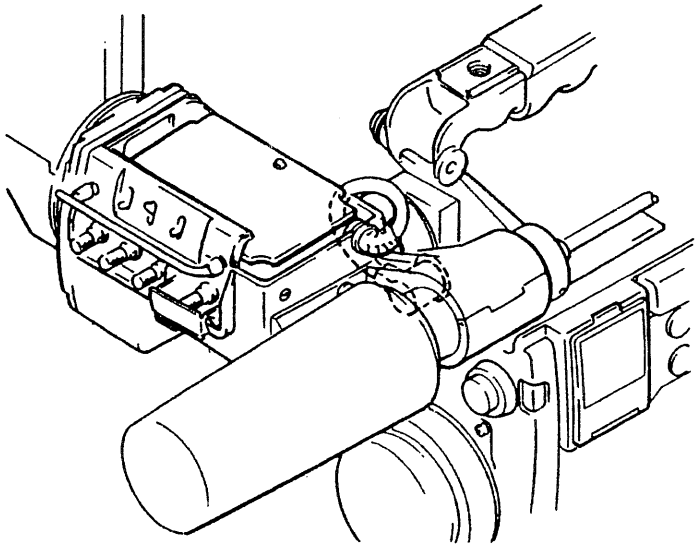
4. As illustrated below, open the VF-56 board while moving it in the direction of the arrow and open the board so that the component side is placed to the upper position.



3. Turn the viewfinder upside down and install it to the camera.



5. Turn the main POWER switch to ON.



I. Vertical Hold Adjustment

- Setting

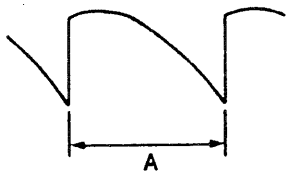
Equipment	Dualtrace oscilloscope	Board	VF-56 board

- Preparation

Extract the IF-443 board from the unit.
Set ⊘RV6 (V SIZE)/VF-56 to the mechanical center. (When ⊘RV6 is marked, it should not be turned.)

- Adjustment procedure

Measurement point: TP3/VF-56
GND E1/VF-56
Adjustment point: ⊘RV5 (V HOLD)/VF-56
Spec.: A = 20.4 ±0.5 ms



- Note

- After adjustment is completed, attach the IF-443 board to the unit.

II. Horizontal Hold Adjustment

- Setting

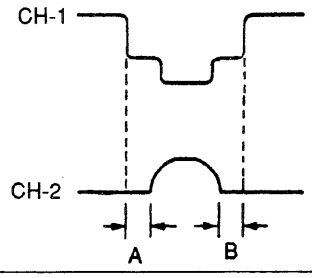
Equipment	Dualtrace oscilloscope	Board	VF-56 board

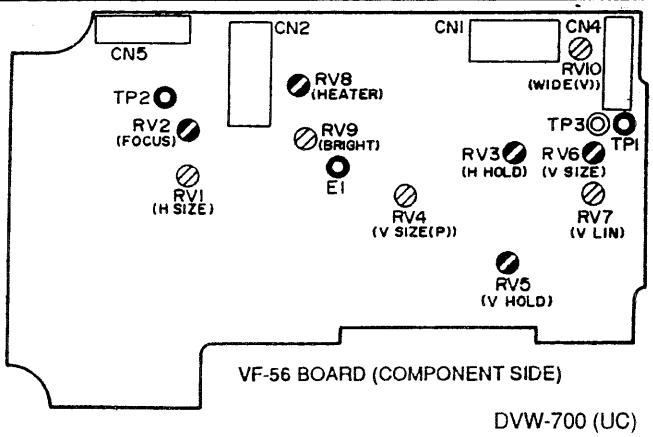
- Preparation

Shoot the fully occupied white area and set the white level to 100 ±2 IRE.

- Adjustment procedure

Measurement point: CH-1. TP2/VF-56
GND E1
CH-2. TP1/VF-56
GND E1
Adjustment point: ⊘RV3 (H HOLD)/VF-56
Spec.: A = B





III. Bright Set Adjustment

• Setting

Equipment		Board	VF-56 board

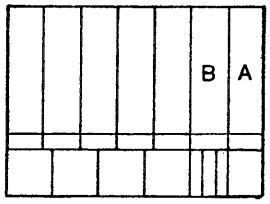
• Preparation

OUTPUT/DCC switch (side panel): BARS/OFF.
BRIGHT control (viewfinder): Fully turn counterclockwise. ↺
CONTRAST control (viewfinder): Fully turn clockwise. ↻

• Adjustment procedure

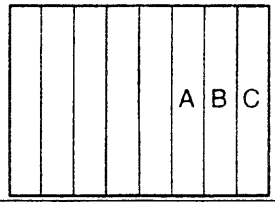
For NTSC model

Measurement point: Viewfinder
Adjustment point: ⊘RV9 (SUB BRIGHT)/VF-56
Spec.: Adjust ⊘RV9/VF-56 so that portions A and B on the viewfinder screen can be barely discriminated.



For PAL model

Measurement point: Viewfinder
Adjustment point: ⊘RV9 (SUB BRIGHT)/VF-56
Spec.: Adjust ⊘RV9/VF-56 so that portions A and B on the viewfinder screen can be barely discriminated, and portions B and C cannot be discriminated.



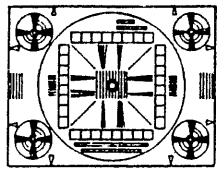
IV. Focus Adjustment

• Setting

Equipment		Board	VF-56 board

• Preparation

Shoot the resolution chart in a full picture frame.
Adjust the iris control so that the output level at the VIDEO OUT terminal is 100 ±2IRE.
Adjust the LENS FOCUS to the best focusing point on the black and white monitor.
Set the BRIGHT and CONTRAST controls of the viewfinder to the mechanical center positions.



(Viewfinder screen)

• Adjustment procedure

Measurement point: Viewfinder
Adjustment point: ⊘RV2 (FOCUS)/VF-56
Spec.: Gradually turn ⊘RV2 (FOCUS) on the VF-56 board from fully counterclockwise to clockwise, and adjust the best focus position. (RV should be turned slowly.)

• Note

After adjustment is completed, check that the focus operation can be performed irrespective of its BRIGHT and CONTRAST controls setting.

V. Picture Frame Adjustment

• Setting

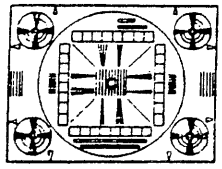
Equipment		Board	VF-56 board

• Note

IV. Focus adjustment and this adjustment affect each other. Repeat these adjustments until both specifications are met.

• Preparation

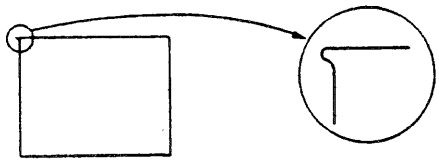
BRIGHT control (viewfinder): mechanical center.
CONTRAST control (viewfinder): mechanical center.
PEAKING control (viewfinder): mechanical center.
Shoot the resolution chart in the full underscan's picture frame by using the zoom lens.



Monitor screen

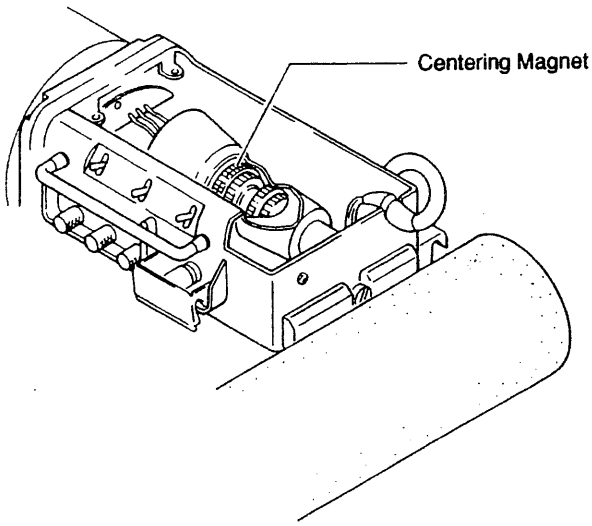
• Adjustment procedure

Step 1.
Measurement point: Viewfinder
Adjustment point: ⊘RV3 (H HOLD)/VF-56
Spec.: If the upper left corner of the picture is distorted, make right angle.

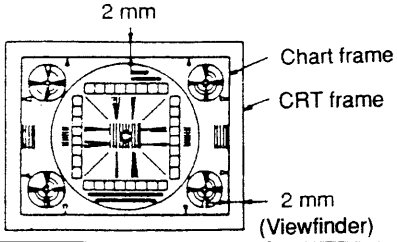


Step 2.
Measurement point: Viewfinder
Adjustment point: ⊘RV7 (V LIN)/VF-56
Spec.: Minimize the distortion of the four circles at the four corners of the resolution chart.

Step 3.
Measurement point: Viewfinder
Adjustment point: ⊘RV1 (H SIZE)/VF-56
⊘RV6 (V SIZE)/VF-56
⊘Centering magnet
Spec.: Adjust ⊘RV1 (H SIZE) and ⊘RV6 (V SIZE) so that the positions of the resolution chart are as shown below. Turn the centering magnet only when the left and lower corners cannot be adjusted.



After adjustment is completed, close the VF-32 board.
Make sure that the picture is in the center of the viewfinder in the normal installing position on the unit.



• Note

When the paint-locked centering magnet is turned, paint-lock it again.

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VI. Heater Voltage Adjustmemt

- Setting

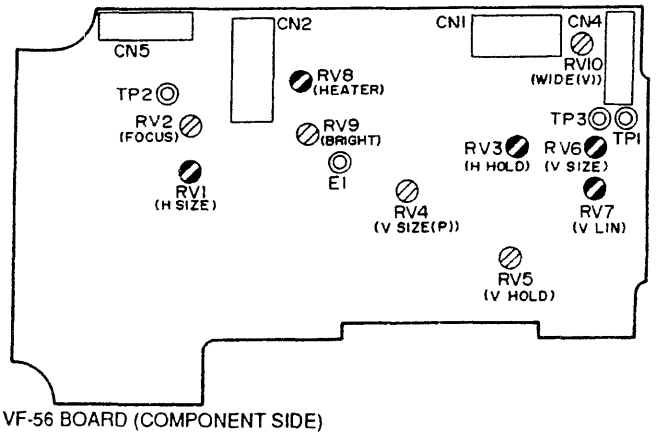
Equipment	Digital voltmeter	Board	VF-56 board

- Preparation

Extract the IF-443 board from the unit.
BRIGHT control (viewfinder): mechanical center.
CONTRAST control (viewfinder): mechanical center.

- Adjustment procedure

Measurement point:	CN5-3 pin/VF-56
	CN5-4 pin/VF-56
Adjustment point:	◐RV8 (HEATER)/VF-56
Spec.:	700 ±10 mVdc



VF-56 BOARD (COMPONENT SIDE)

5-3. VTR SYSTEM ADJUSTMENT

5-3-1. Servo System Adjustment

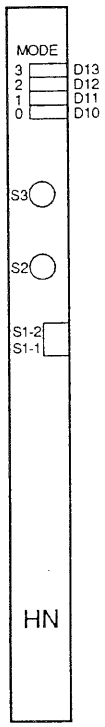
I. Automatic Servo Adjustment

- Setting

Equipment		Board	HN-189 board

- Adjustment procedure

1. S1-1/HN-189: ON
   S1-2/HN-189: OFF
2. Insert a blank tape.
3. Make sure that the indicators from D10 to D13/HN-189 turn off.
4. Push the S3 button and make sure that the D10 indicator lights up.
5. Push the S2 button more than one second, then executed the automatic adjustment mode. (It takes about one minute in this automatic adjustment.)
   - Capstan FG duty ratio
   - Capstan Free Speed
   - Composite Shooting Delay Adjustment (REC, REC-PAUSE)
6. After adjustment is completed, the tape is automatically ejected.
   (Turn off the power after 10 seconds or more of this adjustment, if required.)
   If the adjustment is not completed, repeat from step 1 (the VTR revert to the STOP mode).
7. S1-1/HN-189: OFF
   S1-2/HN-189: OFF



HN-189 BOARD (PANEL SIDE)

II. Automatic PG Phase Adjustment

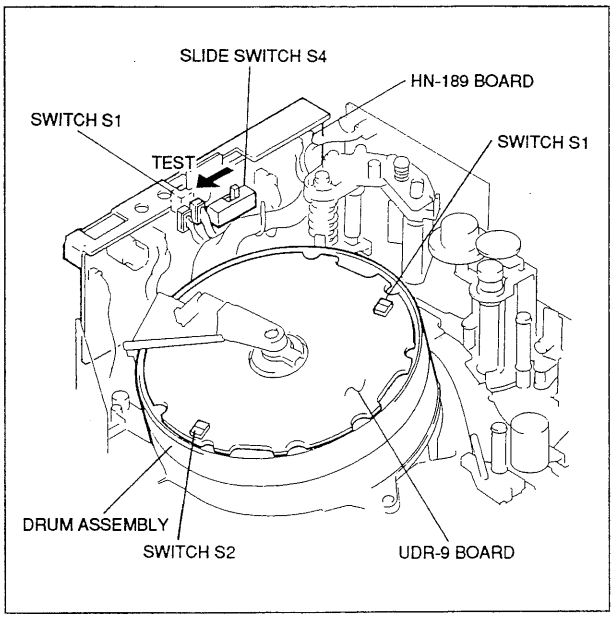
- Setting

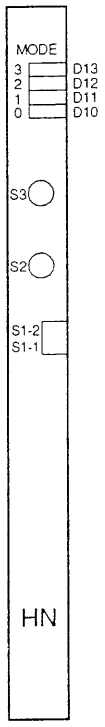
Equipment		Board	HN-189 board

- Adjustment procedure

1. Turn the power off.
2. Select the all four switches of switches S1 and S2 on the UDR-9 board which attaches to the upper drum to the TEST(ON).
3. S4/HN-189: TEST
4. Disconnect the connector that connects to the slip ring and connect the connector of the harness side to the connector CN9 on the HN-189 board.
5. S1-1/HN-189: ON
   S1-2/HN-189: OFF
6. Turn the power on.
7. RV1/HN-189: Fully counterclockwise
8. Push the S3 button two times (less than one second par step).
   Make sure that the D11 indicator lights up.
9. Insert an alignment tape (ZR2-1/P) and play back the 4 MHz (A channel only) recorded portion (TIME;00: 00: 00-14: 59: 29).

   NOTE Never play back the alignment tape 15 minutes and later.
10. Push the S2 button more than one second, then executed the automatic adjustment mode. (It takes about several seconds in this automatic adjustment.)
11. After adjustment is completed, the tape is automatically ejected.
    If the adjustment is not completed, repeat from STEP 1. (the VTR revert to the STOP mode.)
    But the adjustment is not completed again, performs Manual PG Phase Adjustment at the next page.
12. Turn the power off after 10 seconds or more of terminating this adjustment.
13. Select the all four switches of switches S1 and S2 on the UDR-9 board which attaches to the upper drum to the REC(OFF).
14. S4/HN-189: REC
15. Disconnect the connector that connects to the connector CN9 on the HN-189 board and connect the connector of the harness side to the slip ring.
16. S1-1/HN-189: OFF
    S1-2/HN-189: OFF





HN-189 BOARD (PANEL SIDE)

III. Manual PG Phase Adjustment

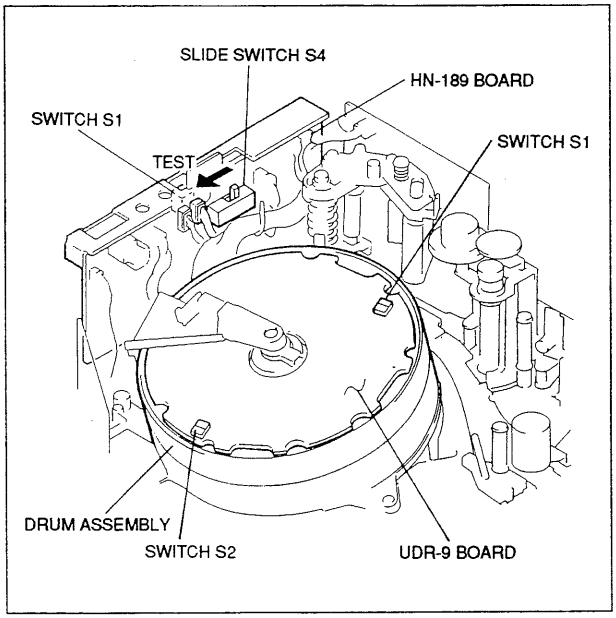
- Setting

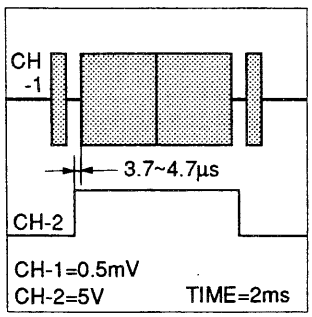
Equipment		Board	HN-189 board

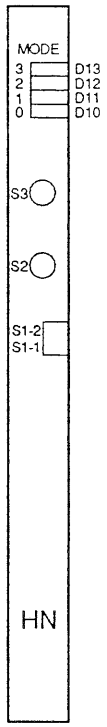
- Adjustment procedure

NOTE Perform this adjustment when II. Automatic PG phase adjustment is not completed.

1. Turn the power off.
2. Connect the 8pin connector of the TP tool to the connector CN7 on the HN-189 board.
3. Connect the 5pin connector of the TP tool to the connector CN3 on the CTL-10 board.
4. Select the all four switches of switches S1 and S2 on the UDR-9 board which attaches to the upper drum to the TEST (ON).
5. S4/HN-189: TEST
6. Disconnect the connector that connects to the slip ring and connect the connector of the harness side to the connector CN9 on the HN-189 board.
7. S1-1/HN-189: ON
   S1-2/HN-189: OFF
8. Connect an oscilloscope.
   CH-1: REC RF A/TP tool
   CH-2: PG ADJ REF/TP tool
   TRIG: SV REF CF/TP tool
   S1-2/HN-189: OFF
9. Turn the power on.
10. Push the S3 button two times (less than one second par step).
    Make sure that the D11 indicator lights up.
11. Insert an alignment tape (ZR2-1/P) and play back the 4 MHz (A channel only) recorded portion (TIME;00: 00: 00-14: 59: 29).
    NOTE Never play back the alignment tape 15 minutes and later.
12. Adjustment point: RV1/HN-189
    Spec.: 3.7 to 4.7 µs
13. After adjustment is completed, push S2 button on the HN-189 board.
14. Push S3 button on the HN-189 board. (The data is saved.)
15. Turn the power switch to off.
16. Disconnect the 8pin connector of the TP tool to the connector CN7 on the HN-189 board.
17. Disconnect the 5pin connector of the TP tool to the connector CN3 on the CTL-10 board.
18. Select the all four switches of switches S1 and S2 on the UDR-9 board which attaches to the upper drum to the REC(OFF).
19. S4/HN-189: REC
20. Disconnect the connector that connects to the connector CN9 on the HN-189 board and connect the connector of the harness side to the slip ring.
21. S1-1/HN-189: OFF
    S1-2/HN-189: OFF







HN-189 BOARD (PANEL SIDE)

5-3-2. Audio System Adjustment

I. CUE PB Level Adjustment

- Setting

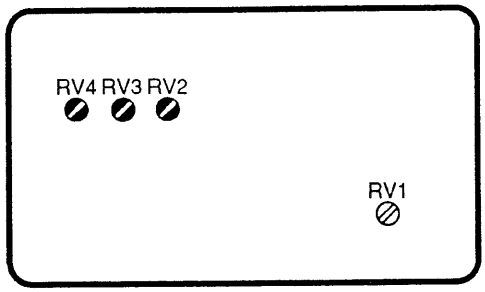
Equipment	Audio Analyzer	Board	CUE-2 board

- Preparation

Set switch as follow.
S301/TC-75 (E-5): ON (CUE ON) ••••• FACTORY SETTING: OFF

- Adjustment procedure

1. Insert an alignment tape (ZR5-1/P) and play back a 1 kHz, 0 VU portion (TIME;00: 00: 00-01: 24: 29).
   Measurement point: AUDIO OUT/Connector Box
   Adjustment point: ⊘RV4/CUE-2
   Spec.: 0 ±0.4 dBm (600 Ω)
2. Push the STOP button.
3. Play back a 1 kHz, –20 VU portion (TIME;01: 30: 00-02: 24: 29).
   Measurement point: AUDIO OUT/Connector Box
   Measure the 1 kHz PB level.
4. Play back a 7 kHz, –20 VU portion (TIME;03: 00: 00-03: 24: 29).
   Measurement point: AUDIO OUT/Connector Box
   Adjustment point: ⊘RV3/CUE-2
   Spec.: 1 kHz PB level ±1.5 dB
5. Play back a 12 kHz, –20 VU portion (TIME;04: 00: 00-04: 24: 29).
   Measurement point: AUDIO OUT/Connector Box
   Adjustment point: ⊘RV2/CUE-2
   Spec.: 1 kHz PB level $^{+1.5}_{-2.0}$ dB
6. Push the STOP button.
7. S301/TC-75 (E-5): OFF (CUE OFF)



CUE-2 BOARD (SOLDERING SIDE)

II. CUE REC Bias Adjustment

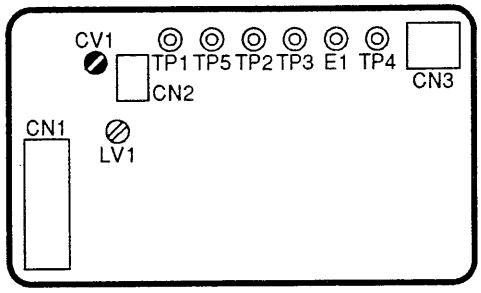
- Setting

Equipment	Audio Analyzer	Board	CUE-2 board

- Adjustment procedure

1. Insert a blank tape and put the unit into the REC mode.
2. Measurement point: TP2/CUE-2
   GND: TP3/CUE-2
   Spec. 15.0 ±1.0 mV rms

   Make sure that the specification is met.
   If not, execute fine adjustment using ⊘CV1/CUE-2.



CUE-2 BOARD (COMPONENT SIDE)

III. CUE REC Level Adjustment

- Setting

Equipment	Audio Analyzer	Board	CUE-2 board

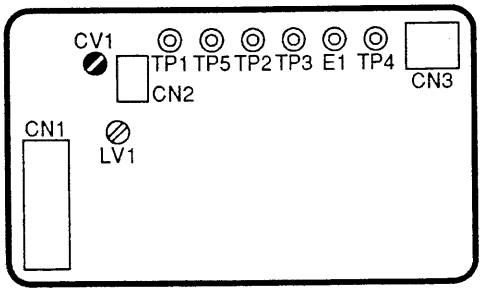
- Preparation

Set switches as follows.
[Inside Panel]
AUDIO SELECT CH1: MANUAL
AUDIO IN CH1: REAR
CUE IN: CH1
MONITOR: CH1
[TC-75 board]
S101 (J-6): OFF (FRONT MIC CONT OFF) ••••• FACTORY SETTING: OFF
S103 (K-4): OFF (CH-1 LIMITER OFF) ••••• FACTORY SETTING: OFF
S301 (E-5): OFF (CUE OFF) ••••• FACTORY SETTING: OFF
[Connector Box]
LINE/MIC/+ 48V ON CH1: LINE
Make sure that the Audio Out Level of the standard VTR is correctly adjusted before performing this adjustment.

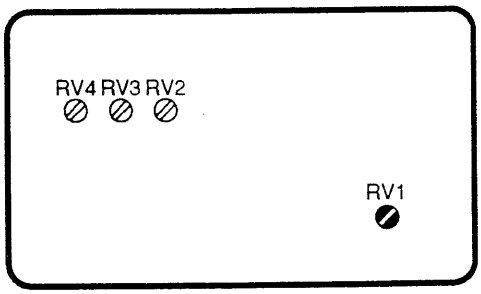
- Adjustment procedure

Measurement point: AUDIO OUT/Standard VTR (DVW-700/P series).

1. Connect the output of low-frequency oscillator (SG-5010) to AUDIO IN CH1 connector. (1 kHz, +4.0 dBu)
2. Measurement point: AUDIO OUT/Connector Box
   Adjustment point: LEVEL CH-1/Inside Panel
   Spec.: 0 ±0.1 dBm (600 Ω)
3. Insert a blank tape, and record the signal about ten seconds.
4. Play back the recorded portion with the standard VTR, and make sure that the specification is met.
   Spec.: 4.0 ±0.2 dBm (600 Ω)
   If the specification is not met, adjust ⊘RV1/CUE-2 and repeat steps 3 and 4 until the specification is met.
5. Low-frequency oscillator (SG-5010): 10 kHz, +4.0 dBu
6. Measurement point: AUDIO OUT/Connector Box
   Adjustment point: LEVEL CH-1/Inside Panel
   Spec.: 0 ±0.1 dBm (600 Ω)
7. Insert a blank tape, and record the signal about ten seconds.
8. Play back the recorded portion with the standard VTR, and make sure that the specification is met.
   Spec.: 4.0 ±2.5 dBm (600 Ω)
9. If not, adjust ⊘CV1/CUE-2 and repeat the steps 1 through 8 to meet the specification.
   Adjustment point: ⊘CV1/CUE-2



CUE-2 BOARD (COMPONENT SIDE)



CUE-2 BOARD (SOLDERING SIDE)

5-3-3. Video System Adjustment (Equalizer)

- Preparation

Connect the Channel Condition Checker to the unit.
S401 (NTSC/PAL) /Channel Condition Checker: NTSC (for NTSC)/PAL (for PAL)
S402 (CK ON/OFF) /Channel Condition Checker: ON
Turn the power on the Channel Condition Checker, and make sure that the NTSC LED (green) /PAL LED (red) and CK LED (yellow) light up.

I. Equalizer PLL Adjustment (A/Ech)

- Setting

Equipment	Oscilloscope, Channel Condition Checker	Board	EQ-48 (1) board

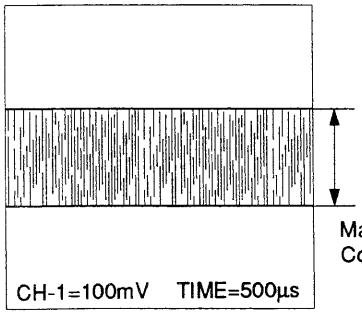
- Preparation

Connect the Channel Condition Checker to the unit (S401: NTSC (for NTSC) /PAL (for PAL), S402: ON).

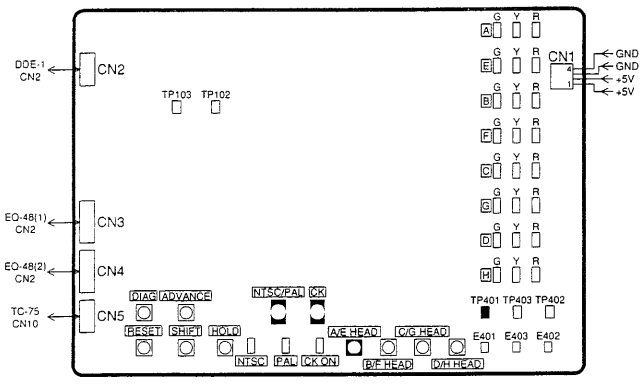
- Adjustment procedure

1. Insert a blank tape and put the unit into the PB mode.
2. Push the A/E HEAD button on the Channel Condition Checker.

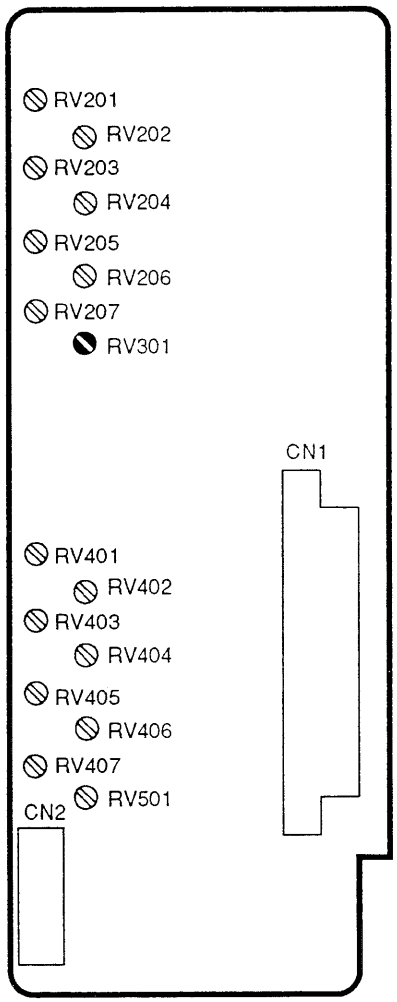
Measurement point: TP401/Channel Condition Checker
TRIG: TP401/Channel Condition Checker
Adjustment point: ◐ RV301/EQ-48 (1)



Maximize
Confirm that the low-frequency wave is seen.



(Channel condition checker)



EQ-48 BOARD (COMPONENT SIDE)

II. Equalizer PLL Adjustment (B/F, C/G, D/Hch)

- Setting

Equipment	Oscilloscope, Channel Condition Checker	Board	EQ-48 board

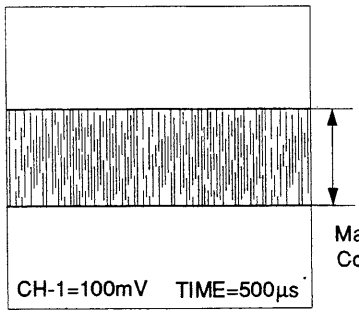
- Preparation

Adjust the B/F, C/G and D/H channels adjust as in the case of the A/E channel.
Connect the Channel Condition Checker to the unit (S401: NTSC (for NTSC) /PAL (for PAL), S402: ON).

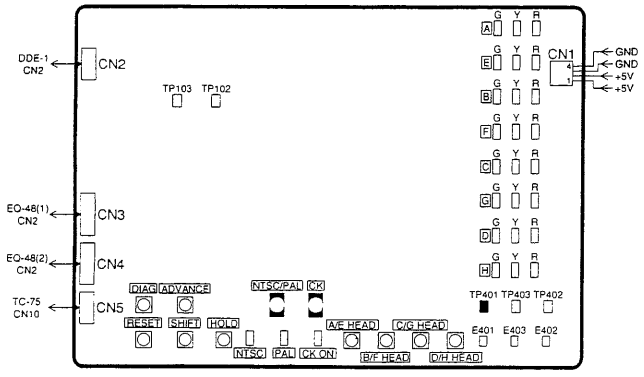
- Adjustment procedure

1. Insert a blank tape and put the unit into the PB mode.
2. Adjust as follows in sequence.

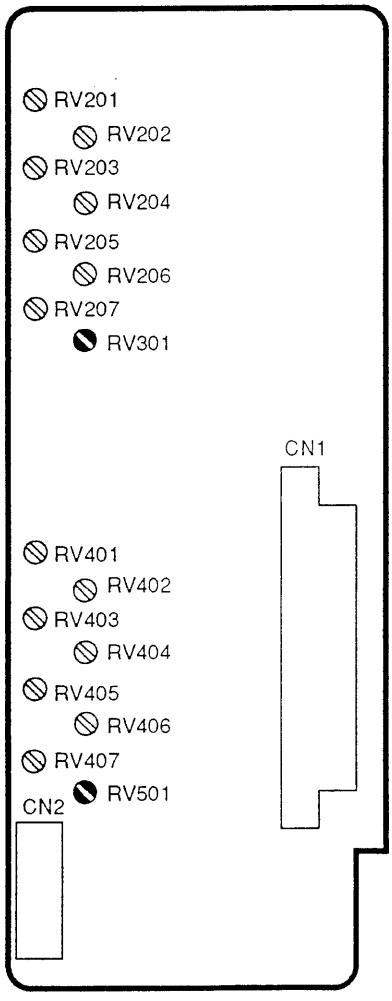
	Switch setting	Measurement point/TRIG	Adjustment point
①	B/F HEAD	TP401/Checker	⊘RV501/EQ-48 (1)
②	C/G HEAD	TP401/Checker	⊘RV301/EQ-48 (2)
③	D/H HEAD	TP401/Checker	⊘RV501/EQ-48 (2)



Maximize
Confirm that the low-frequency wave is seen.



(Channel condition checker)



EQ-48 BOARD (COMPONENT SIDE)

III. Equalizer Input Level Adjustment (A/Ech)

- Setting

Equipment	Oscilloscope, Channel Condition Checker	Board	EQ-48 (1) board

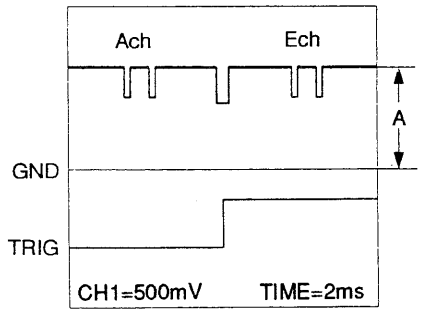
- Preparation

Connect the Channel Condition Checker to the unit (S401: NTSC (for NTSC) /PAL (for PAL), S402: OFF).

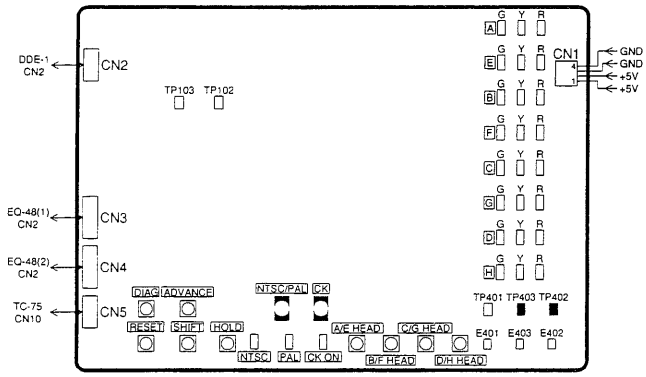
- Adjustment procedure

1. Insert an alignment tape (ZR5-1/P) and put the unit into the PB mode.
2. Push the A/E HEAD button on the Channel Condition Checker.

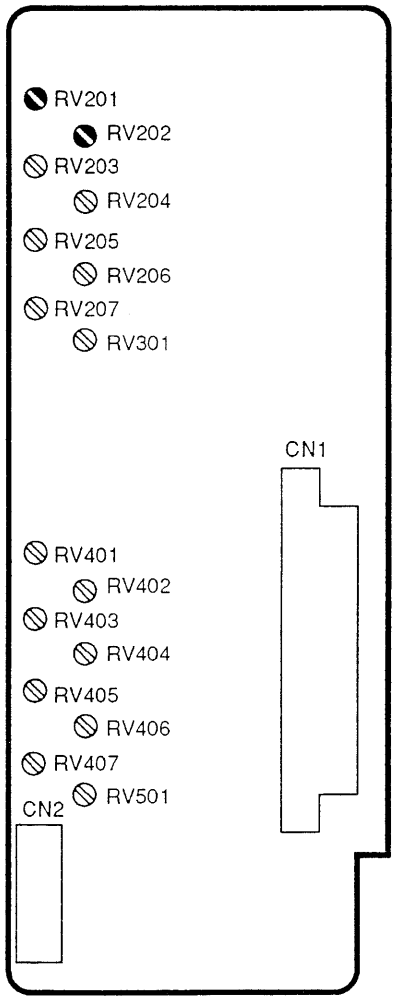
Measurement point: TP403/Channel Condition Checker
TRIG: TP402/Channel Condition Checker
Adjustment point: ⊘ RV201/EQ-48 (1) : Ach HEAD
⊘ RV202/EQ-48 (1) : Ech HEAD



A=2.00 ±0.05 Vdc



(Channel condition checker)



EQ-48 BOARD (COMPONENT SIDE)

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IV. Equalizer Input Level Adjustment (B/F, C/G, D/Hch)

- Setting

Equipment	Oscilloscope, Channel Condition Checker	Board	EQ-48 board

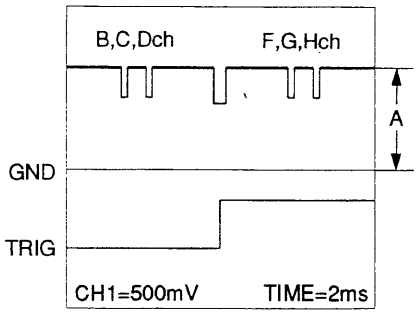
- Preparation

Adjust the B/F, C/G and D/H channels adjust as in the case of the A/E channel.
Connect the Channel Condition Checker to the unit (S401: NTSC (for NTSC) /PAL (for PAL), S402: OFF).

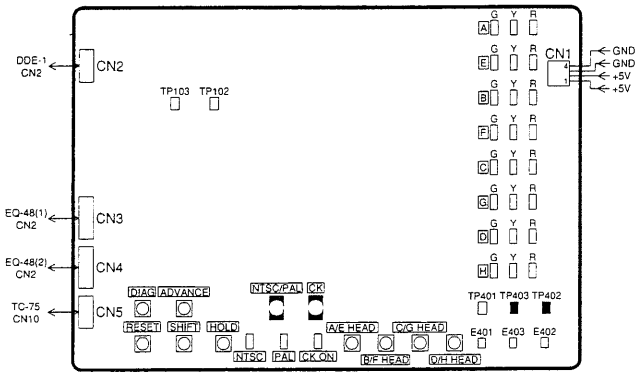
- Adjustment procedure

1. Insert an alignment tape (ZR5-1/P) and put the unit into the PB mode.
2. Adjust as follows in sequence.
   (TRIG: TP402/Channel Condition Checker)

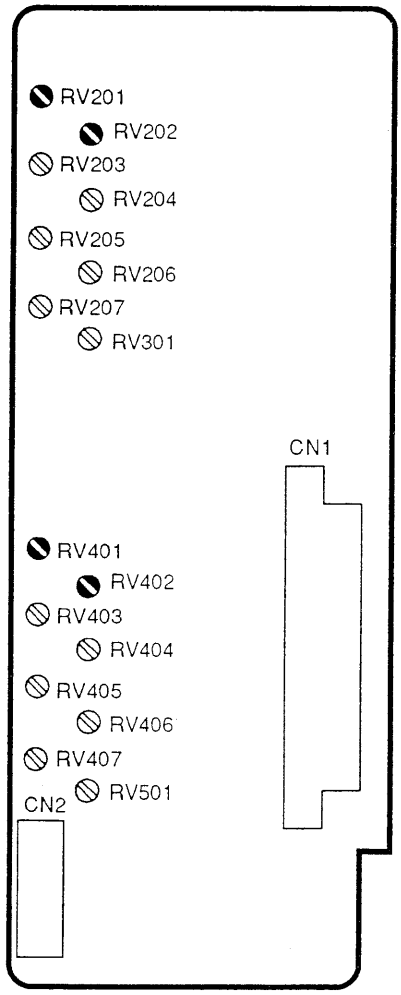
	Switch setting	Measurement point	Adjustment point
①	B/F HEAD/Checker	TP403/Checker	⊘RV401/EQ-48 (1) , ⊘RV402/EQ-48 (1)
②	C/G HEAD/Checker	TP403/Checker	⊘RV201/EQ-48 (2) , ⊘RV202/EQ-48 (2)
③	D/H HEAD/Checker	TP403/Checker	⊘RV401/EQ-48 (2) , ⊘RV402/EQ-48 (2)



A=2.00 ±0.05 Vdc



(Channel condition checker)



EQ-48 BOARD (COMPONENT SIDE)

V. Equalizer Adjustment (A/Ech)

- Setting

Equipment	Oscilloscope, Channel Condition Checker	Board	EQ-48 (1) board

- Preparation

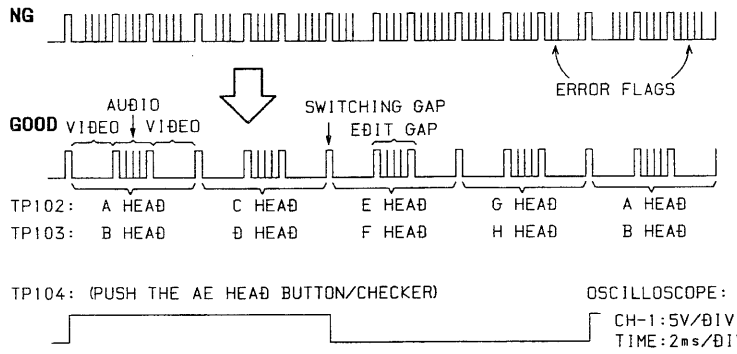
Connect the Channel Condition Checker to the unit (S401: NTSC (for NTSC)/PAL (for PAL), S402: OFF).
Make sure that the switches on the channel condition checker are set correctly.(S101:C, S102:1)
Push the DIAG button on the Channel Condition Checker and put the unit into the DIAG mode.
Push the ADVANCE button 12 times on the Channel Condition Checker, and display the word "c1 **" on the LCD.
(**: Hexadecimal number)

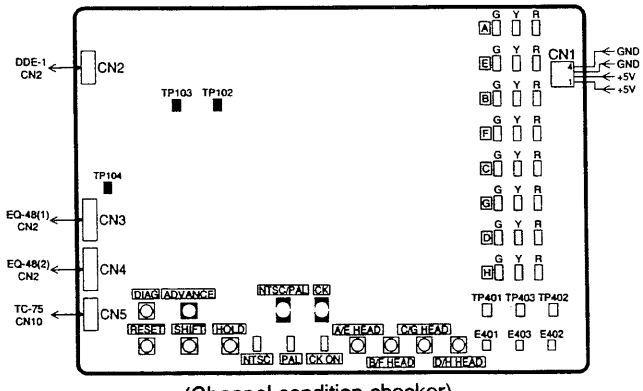
- Adjustment procedure

1. Insert an alignment tape (ZR5-1/P) and put the unit into the PB mode.
2. Adjust the following variable resistors to meet into the specification.

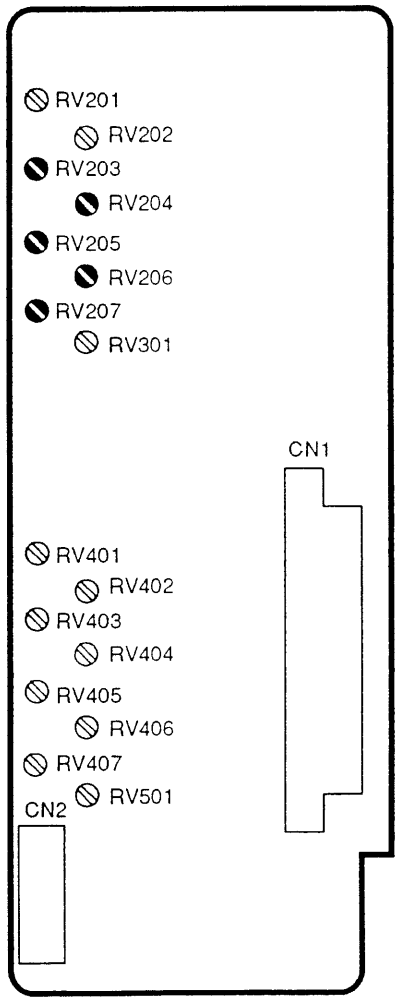
Adjustment procedure	Ach	Ech
TCMP THRS	⊘RV207/EQ-48 (1)	
COS EQ	⊘RV205/EQ-48 (1)	⊘RV206/EQ-48 (1)
PEQ	⊘RV203/EQ-48 (1)	⊘RV204/EQ-48 (1)
Spec.	Adjust the error flags to minimum at TP102/ Channel Condition Checker and Ach condition LED (green or yellow) to light up. If the red LED lights up, LED lighting within 3 seconds is acceptable.	Adjust the error flags to minimum at TP102/ Channel Condition Checker and Ech condition LED (green or yellow) to light up. If the red LED lights up, LED lighting within 3 seconds is acceptable.

When ⊘RV207 is turned, comfirm that the level of both Ach and Ech meet the Specification.





(Channel condition checker)



EQ-48 BOARD (COMPONENT SIDE)

VI. Equalizer Adjustment (C/G, B/F, D/Hch)

- Setting

Equipment	Oscilloscope, Channel Condition Checker	Board	EQ-48 board

- Preparation

Adjust the C/G, B/F, D/H channels just as in the case of A/Ech. The adjustment order is C/G, B/F, D/H channels.

- Adjustment procedure

1. Insert an alignment tape (ZR5-1/P) and put the unit into the PB mode.
2. Adjust the following variable resistors, to meet the specification.

Adjustment procedure	Cch	Gch
TCMP THRS	⊘RV207/EQ-48 (2)	
COS EQ	⊘RV205/EQ-48 (2)	⊘RV206/EQ-48 (2)
PEQ	⊘RV203/EQ-48 (2)	⊘RV204/EQ-48 (2)
Spec.	Adjust the error flags to minimum at TP102/ Channel Condition Checker and Cch condition LED (green or yellow) to light up. If the red LED lights up, LED lighting within 3 seconds is acceptable.	Adjust the error flags to minimum at TP102/ Channel Condition Checker and Gch condition LED (green or yellow) to light up. If the red LED lights up, LED lighting within 3 seconds is acceptable.

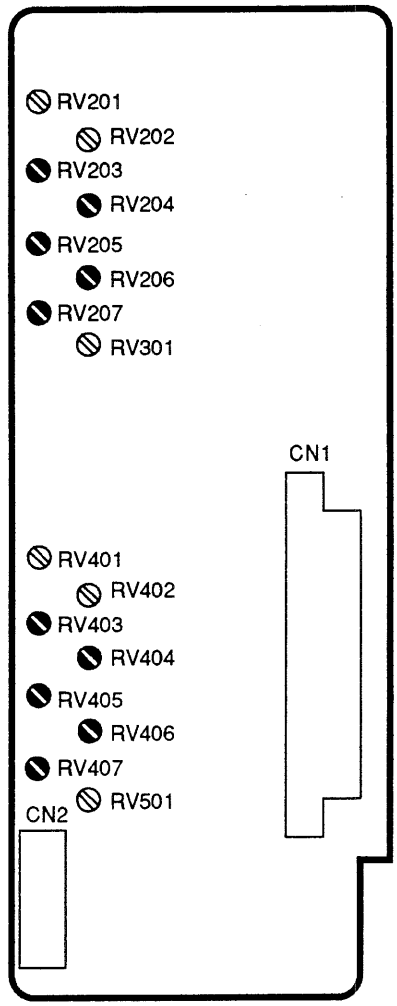
When ⊘RV207 is turned, comfirm that the level of both Cch and Gch meet the Specification.

Adjustment procedure	Bch	Fch
TCMP THRS	⊘RV407/EQ-48 (1)	
COS EQ	⊘RV405/EQ-48 (1)	⊘RV406/EQ-48 (1)
PEQ	⊘RV403/EQ-48 (1)	⊘RV404/EQ-48 (1)
Spec.	Adjust the error flags to minimum at TP103/ Channel Condition Checker and Bch condition LED (green or yellow) to light up. If the red LED lights up, LED lighting within 3 seconds is acceptable.	Adjust the error flags to minimum at TP103/ Channel Condition Checker and Fch condition LED (green or yellow) to light up. If the red LED lights up, LED lighting within 3 seconds is acceptable.

When ⊘RV407 is turned, comfirm that the level of both Bch and Fch meet the Specification.

Adjustment procedure	Dch	Hch
TCMP THRS	⊘RV407/EQ-48 (2)	
COS EQ	⊘RV405/EQ-48 (2)	⊘RV406/EQ-48 (2)
PEQ	⊘RV403/EQ-48 (2)	⊘RV404/EQ-48 (2)
Spec.	Adjust the error flags to minimum at TP103/ Channel Condition Checker and Dch condition LED (green or yellow) to light up. If the red LED lights up, LED lighting within 3 seconds is acceptable.	Adjust the error flags to minimum at TP103/ Channel Condition Checker and Hch condition LED (green or yellow) to light up. If the red LED lights up, LED lighting within 3 seconds is acceptable.

When ⊘RV407 is turned, comfirm that the level of both Dch and Hch meet the Specification.



EQ-48 BOARD (COMPONENT SIDE)

VII. Recording Current Adjustment (Ach)

- Setting

Equipment	Channel Condition Checker	Board	

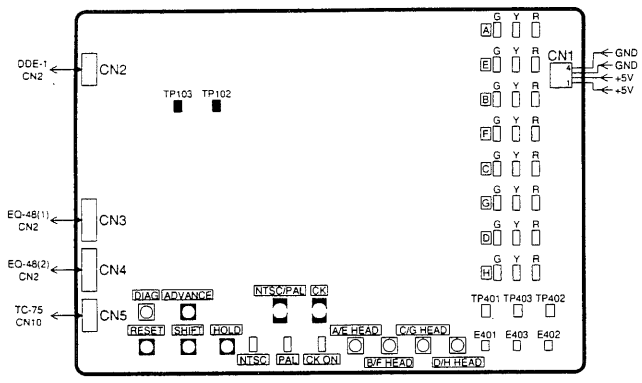
- Preparation

Connect the Channel Condition Checker to the unit (S401: NTSC (for NTSC)/PAL (for PAL), S402: OFF).
Make sure that the switches on the channel condition checker are set correctly.(S101:C, S102:1)
Push the DIAG button on the Channel Condition Checker and put the unit into the DIAG mode.
Push the ADVANCE button 12 times on the Channel Condition Checker, and display the word "c1 **" on the LCD.
(**: Hexadecimal number)
Set switches as follows.
[Inside Panel]
DISPLAY CTL/TC/U-BIT: U-BIT
TC PRESET/REGEN: REGEN
TC F-RUN/SET/R-RUN: R-RUN (REC-RUN)
REAL TIME ON/OFF/SET: SET

Push the HOLD button three times on the Channel Condition Checker.
Push the RESET button one time on the Channel Condition Checker.
Push the HOLD button two times on the Channel Condition Checker.
Push the RESET button one time on the Channel Condition Checker.
Push the HOLD button one time on the Channel Condition Checker.
Then, put the unit into the Recording Current Setting mode (blink the hexadecimal number on the LCD).

- Adjustment procedure

1. Push the ADVANCE and/or SHIFT buttons on the Channel Condition Checker, and display the word "c1 **" (Recording Current Data) on the LCD. ("c1 37": for NTSC, "c1 34": for PAL)
2. Insert a blank tape, and record the signal about 30 seconds.
3. Play back the recorded portion, and make sure that the specification is met.
   Spec.: Ach condition LED (green or yellow) lights up.
   (If the red LED lights up, LED lighting within 3 seconds is acceptable.)
4. If not, change the recording current data with the ADVANCE and/or SHIFT buttons on the Channel Condition Checker, and repeat the steps 2 and 3 to meet the specification.
5. If not to meet the specification, perform the following 3 steps.
   a) Push the ADVANCE and/or SHIFT buttons on the Channel Condition Checker, and display the word "c1 **" (Recording Current Data) on the LCD. ("c1 37": for NTSC, "c1 34": for PAL)
   b) Insert a blank tape, and record the signal about 30 seconds.
   c) Fine adjust the equalizer referring to section 6-5-5. Equalizer Adjustment (A/Ech)



(Channel condition checker)

VIII. Recording Current Adjustment (Bch-Hch)

- Setting

Equipment	Channel Condition Checker	Board	

- Preparation

Adjust Bch to Hch just as in the case of Ach.
After the adjustment of Ach is completed, push the HOLD button on the Channel Condition Checker and put the unit into the adjustment of Bch.

- Adjustment procedure

1. Push the ADVANCE and/or SHIFT buttons on the Channel Condition Checker, and display the word "c1 **" (Recording Current Data) on the LCD. ("c1 37": for NTSC, "c1 34": for PAL)
2. Insert a blank tape, and record the signal about 30 seconds.
3. Play back the recorded portion, and make sure that the specification is met.
   Spec.: Bch condition LED (green or yellow) lights up.
   (If the red LED lights up, LED lighting within 3 seconds is acceptable.)
4. If not, change the recording current data with the ADVANCE and/or SHIFT buttons on the Channel Condition Checker, and repeat the steps 2 and 3 to meet the specification.
   If not to meet the specification by above steps, execute the equalizer fine adjustment referring to section VII.
5. Repeat the steps 1 through 4 to adjust Bch to Hch.
   (When move the next channel, push the HOLD button on the Channel Condition Checker.)
6. After the adjustment of Hch is completed, push the HOLD button on the Channel Condition Checker.
   (Write the adjustment data into the EEPROM.)
7. Check the LCD panel's display.
   "c-O*****": OK
   "c-E*****": NG
   If the result of adjustment is not good, adjust from Ach.
8. If the equalizer fine adjustment is executed, check as follows.
   a) Insert an alignment tape (ZR5-1/P) and put the unit into the PB mode.
   b) Make sure that the specification is met.
      Spec.: All channel condition LEDs (green or yellow) to light up.
      (If the red LED lights up, LED lighting within 3 seconds is acceptable.)
   c) If not, adjust as follows.
      (1) Excute the equalizer adjustment of the channel which the specification is not met. (Refer to sections V and VI. (Equalizer adjustment))
      (2) Excute the recording current adjustment of the channel which the specification is not met. (Refer to sections VII and VIII. (Recording Current Adjustment))
9. Push the DIAG button on the Channel Condition Checker and out of the DIAG mode.

ch: display
Ach:c1 **
Bch:c2 **
Cch:c3 **
Dch:c4 **
Ech:c5 **
Fch:c6 **
Gch:c7 **
Hch:c8 **

5-4. CAMERA SYSTEM ADJUSTMENT (FOR DVW-700WS/WSP)

Screen mode	

5-4-1. ENC Gain Adjustment

- Setting

Equipment	Waveform monitor	Board	

- Preparation

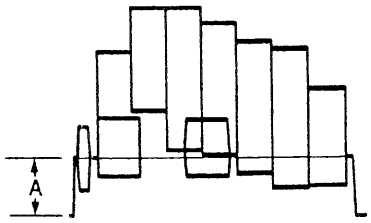
Connect a waveform monitor to the TEST OUT connector.

- Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector

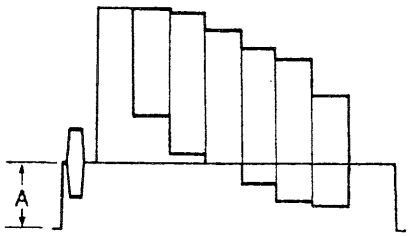
1. Set the OUTPUT/DCC switch on the side panel to BARS.
2. Set the MENU switch on the side panel to ON.
3. On the setting menu, set PAGE and ITEM as follows:
   PAGE: D/A GAIN
   ITEM: ENC GAIN
4. Adjust level A for the following specification by pressing the UP/DOWN button on the side panel.
   A = 40 ±2 IRE (for NTSC model)
   A = 300 ±10 mV (for PAL model)

NTSC model



(Waveform monitor)

PAL model



(Waveform monitor)

Screen mode	

5-4-2. ENC Level Adjustment

- Setting

Equipment	Waveform monitor	Board	

- Preparation

Connect a waveform monitor to the TEST OUT connector.

- Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector

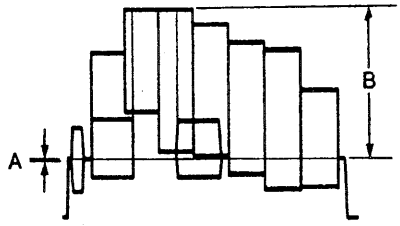
1. Set the OUTPUT/DCC switch on the side panel to BARS.
2. Set the MENU switch on the side panel to ON.

NTSC model only

3. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 4/9
   ITEM: ENC SETUP LEVEL
4. Adjust the level A to meet the following specification by pressing the UP/DOWN button on the side panel.
   A = 7.5 IRE

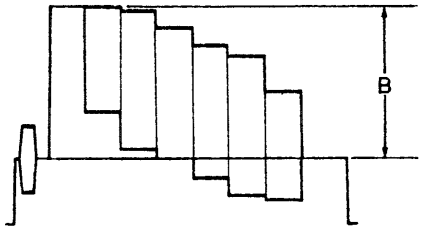
5. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 4/9
   ITEM: ENC Y LEVEL
6. Adjust the level B to meet the following specification by pressing the UP/DOWN button on the side panel.
   B = 100 ±2 IRE (for NTSC model)
   B = 700 ±10 mV (for PAL model)

NTSC model



(Waveform monitor)

PAL model



(Waveform monitor)

5-4-3. VA Gain Adjustment

Screen mode	16:9

• Setting

Equipment	Waveform monitor	Board	VA-144 board

• Note

Use a reflective chart in this adjustment, if possible. Adjust the color temperature to 3200k exactly. If a pattern box is used, check its state before use.
Never change the setting of the following variable capacitors. These capacitors are difficult to adjust.
VA-144 board: ⊘CT101, ⊘CT201, ⊘CT301
Set the luminous intensity of the chart to 2000 lx.
If the "16:9" chart is not kept on hand, it is acceptable to perform the adjustment at "4:3" mode using a "4:3" chart.

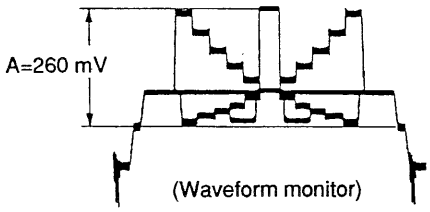
• Preparation

Connect a waveform monitor to the TEST OUT connector. Shoot the gray-scale chart (16:9) as large as possible on the screen. Set the WHITE BAL switch to PRST.

• Adjustment procedure

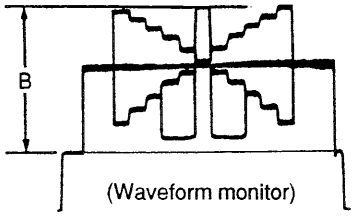
Adjustment point: ⊘RV101 (R GAIN); VA-144 board
⊘RV201 (G GAIN); VA-144 board
⊘RV301 (B GAIN); VA-144 board
Measurement point: TEST OUT connector
Object: Gray-scale chart (16:9)

1. Set the OUTPUT/DCC switch on the side panel to CAM/ON.
2. Set the AUTO W/B BAL switch on the front panel to BLK to perform the automatic black balance adjustment.
3. Connect the oscilloscope to CN1-48 pin on the VA-144 board. Adjust this iris control so that the level A is 260 mV.



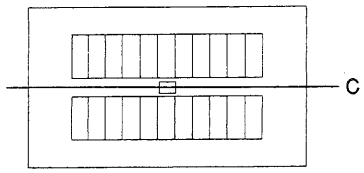
(Waveform monitor)

4. Set the MENU switch on the side panel to ON.
5. On the setting menu, set PAGE and ITEM as follows:
   PAGE: TEST OUT
   ITEM: G
6. Adjust the level B for the following specification by using variable resistor ⊘RV201 (G GAIN); VA-144 board.
   B = 100 ± 2 IRE (for NTSC model)
   B = 700 ± 10 mV (for PAL model)

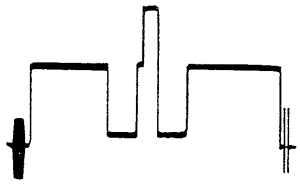


(Waveform monitor)

7. On the setting menu, set PAGE and ITEM as follows:
   PAGE: TEST OUT
   ITEM: ENC
8. On the setting menu, set PAGE and ITEM as follows:
   PAGE: FUNCTION 1/2
   ITEM: GAMMA → OFF
9. Select 15 lines at portion C by using the waveform monitor.
10. Set the waveform monitor to the CHROMA mode.
11. Minimize carrier leak D by using for variable resistor ⊘RV101 (R GAIN) and ⊘RV301 (B GAIN) on the VA-144 board.
12. On the setting menu, set PAGE and ITEM as follows:
    PAGE: FUNCTION 1/2
    ITEM: GAMMA → ON



(Monitor screen)



(Waveform monitor)

(Waveform monitor)

VA-144 BOARD
(PANEL SIDE)

5-4-4. White Shading Adjustment

Screen mode	16:9

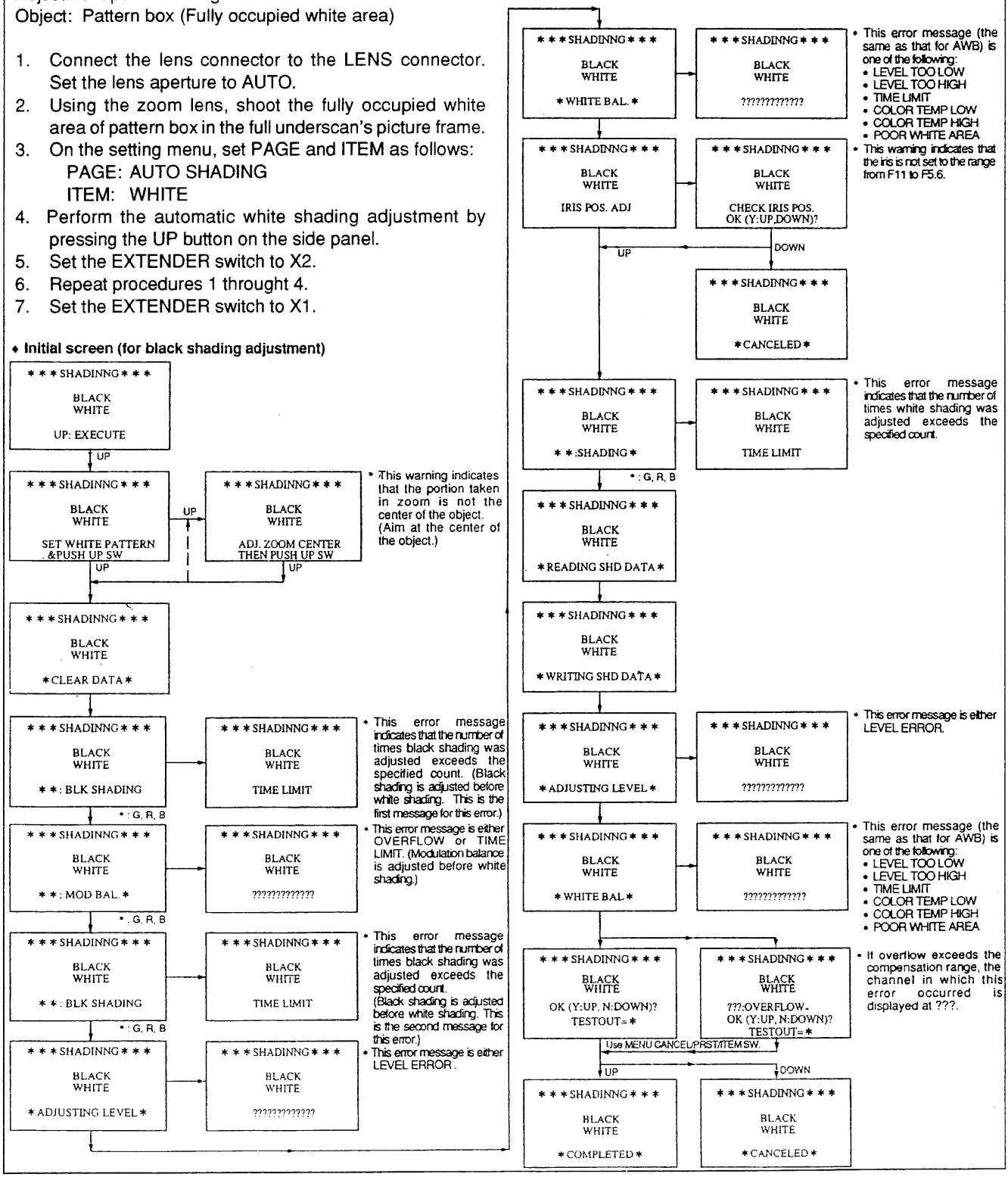
If the white shading appears, it is considered that several conditions such as an uneven white pattern luminance, lens iris and lens zoom are not good .
When the error occurs, first check whether the above conditions are good or not looking in the viewfinder screen.

- Adjustment procedure

Adjustment point: Setting menu
Object: Pattern box (Fully occupied white area)

1. Connect the lens connector to the LENS connector. Set the lens aperture to AUTO.
2. Using the zoom lens, shoot the fully occupied white area of pattern box in the full underscan's picture frame.
3. On the setting menu, set PAGE and ITEM as follows:
   PAGE: AUTO SHADING
   ITEM: WHITE
4. Perform the automatic white shading adjustment by pressing the UP button on the side panel.
5. Set the EXTENDER switch to X2.
6. Repeat procedures 1 throught 4.
7. Set the EXTENDER switch to X1.

♦ **Initial screen (for black shading adjustment)**


* * * SHADINNG * * *
BLACK
WHITE
UP: EXECUTE
UP
SET WHITE PATTERN &PUSH UP SW
ADJ. ZOOM CENTER THEN PUSH UP SW
• This warning indicates that the portion taken in zoom is not the center of the object. (Aim at the center of the object.)
* CLEAR DATA *
**: BLK SHADING
• : G, R, B
TIME LIMIT
• This error message indicates that the number of times black shading was adjusted exceeds the specified count. (Black shading is adjusted before white shading. This is the first message for this error.)
**: MOD BAL. *
?????????????
• This error message is either OVERFLOW or TIME LIMIT. (Modulation balance is adjusted before white shading.)
• This error message indicates that the number of times black shading was adjusted exceeds the specified count. (Black shading is adjusted before white shading. This is the second message for this error.)
* ADJUSTING LEVEL *
• This error message is either LEVEL ERROR.
* WHITE BAL. *
IRIS POS. ADJ
CHECK IRIS POS. OK (Y:UP,DOWN)?
DOWN
* CANCELED *
• This warning indicates that the iris is not set to the range from F11 to F5.6.
**:SHADING *
TIME LIMIT
• This error message indicates that the number of times white shading was adjusted exceeds the specified count.
* READING SHD DATA *
* WRITING SHD DATA *
* ADJUSTING LEVEL *
• This error message is either LEVEL ERROR.
* WHITE BAL *
• This error message (the same as that for AWB) is one of the following:
• LEVEL TOO LOW
• LEVEL TOO HIGH
• TIME LIMIT
• COLOR TEMP LOW
• COLOR TEMP HIGH
• POOR WHITE AREA
OK (Y:UP, N:DOWN)?
TESTOUT= *
???:OVERFLOW-
OK (Y:UP, N:DOWN)?
TESTOUT= *
• If overflow exceeds the compensation range, the channel in which this error occurred is displayed at ???.
Use MENU CANCEL/PRST/ITEM SW.
UP
DOWN
* COMPLETED *
* CANCELED *

5-4-5. Gamma Correction Adjustment

Screen mode	

- Setting

Equipment	Waveform monitor, Vectorscope	Board	

- Preparation

Connect a waveform monitor to the TEST OUT connector,
and connect a vectorscope to the VIDEO OUT connector.
Shoot a gray-scale chart in the full underscan's picture frame.

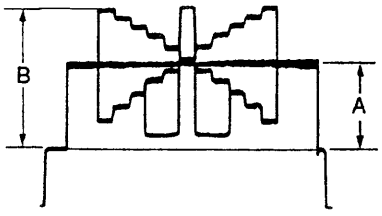
- Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector
Object: Gray-scale chart
Lens IRIS: Adjust the white level as follow:
B=100 ±2 IRE (for NTSC model)
B=700 ±10 mV (for PAL model)

1. Set the OUTPUT/DCC switch on the side panel to CAM/ON.
2. Set the MENU switch on the side panel to ON.
3. On the setting menu set PAGE and ITEM as follows in the specified order.

	PAGE	ITEM
①	LEVEL 5/9	TEST OUT → G
②	LEVEL 3/9	MASTER GAMMA

4. Set the setting menu to setting ② described above. By pressing the UP/Down button, set the level A as follow:
A = 63 ±2 IRE (for NTSC model)
A = 430 ±14 mV (for PAL model)

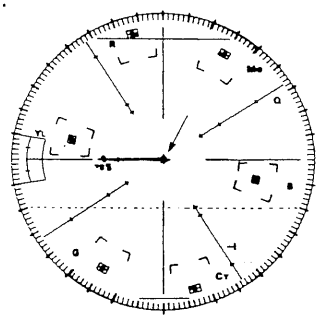


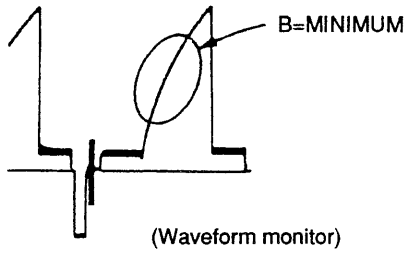
(Waveform monitor)

5. On the setting menu set PAGE and ITEM as follows in the specified order.

	PAGE	ITEM
③	LEVEL 5/9	TEST OUT → ENC
④	FUNCTION 1/2	TEST SAW ON
⑤	LEVEL 5/9	R GAMMA
⑥	LEVEL 5/9	B GAMMA

6. Under setting ⑤, adjust the dot at the near center of the vectorscope by pressing the UP/DOWN button on the side panel.
7. Under setting ⑥, adjust the dot at the near center of the vectorscope by pressing the UP/DOWN button on the side panel.
8. Repeat steps 6 and 7 alternately.
9. Make sure that the carrier leak at portion B is not ofserved.





(Waveform monitor)

10. On the setting menu, set PAGE and ITEM as follows:
PAGE:FUNCTION 1/2
ITEM: TEST SAW → OFF

http://getMANUAL.com

Screen mode	

5-4-6. Black Set Adjustment

- Setting

Equipment	Waveform monitor	Board	

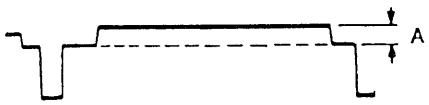
- Preparation

Connect a waveform monitor to the TEST OUT connector.

- Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector
Lens IRIS: C (Close)

1. Set the OUTPUT/DCC switch on the side panel to CAM/ON.
2. Set the MENU switch on the side panel to ON.
3. On the setting menu, set PAGE and ITEM as follows:
   PAGE: TEST OUT
   ITEM: G
4. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 3/9
   ITEM: MASTER BLACK
5. Adjust the level A to meet the following specification by pressing the UP/DOWN button on the side panel.
   A = 3 ±2 IRE (for NTSC model)
   A = 20 ±14 mV (for PAL model)
6. On the setting menu, set PAGE and ITEM as follows:
   PAGE: TEST OUT
   ITEM: ENC
7. Set the MENU switch on the side panel to OFF.
8. Set the AUTO W/B BAL switch on the front panel to BLK, to perform the AUTO BLACK BAL adjustment.



(Waveform monitor)

5-4-7. Flare Adjustment

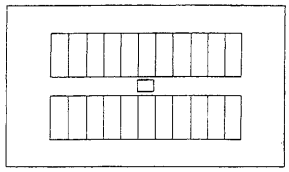
Screen mode	16:9

- Setting

Equipment	Waveform monitor	Board	

- Preparation

Connect a waveform monitor to the TEST OUT connector. Shoot a gray-scale chart (16:9) in the full underscan's picture frame .

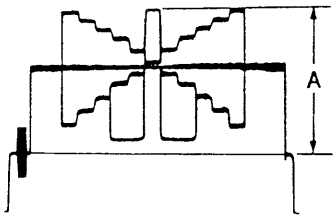


Monitor screen

- Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector
Object: Gray-scale chart (16:9)
lens IRIS: Adjust the white level as follow:
A = 100 ±2 IRE (for NTSC model)
A = 700 ±10 mV (for PAL model)

1. Set the OUTPUT/DCC switch on the side panel to CAM/ON.
2. Open the lens iris by one step from the reference setting (corresponding to A).

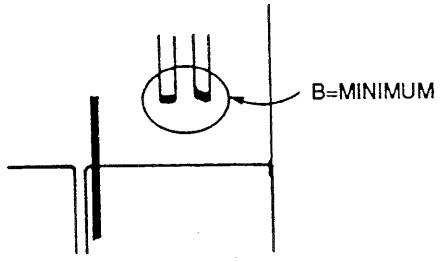


(Waveform monitor)

3. Set the MENU switch on the side panel to ON.
4. Make sure that the value of PAGE: LEVEL 5/9, ITEM: G FLARE is 0 (zero) by using the setting menu.
5. Select the 15 lines at the center of the monitor screen by the using the 15 LINE select and variable control on the waveform monitor.
6. On the setting menu set PAGE and ITEM as follows in the specified order.

	PAGE	ITEM
①	LEVEL 5/9	R FLARE
②	LEVEL 5/9	B FLARE

7. Under setting ①, minimize the carrier leak at portion B by pressing the UP/DOWN button on the side panel.
8. Under setting ②, minimize the carrier leak at portion B by pressing the UP/DOWN button on the side panel.



(Waveform monitor)

9. Repeat steps 6 and 7 alternately.

Screen mode	

5-4-8. Manual Knee and White Clip Adjustment

• Setting

Equipment	Waveform monitor	Board	

• Preparation

Connect a waveform monitor to the TEST OUT connector.

• Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector

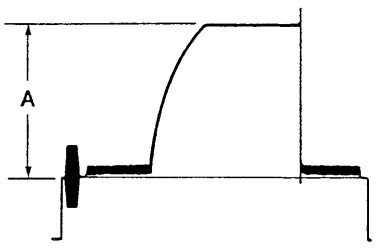
1. Set the OUTPUT/DCC switch on the side panel to CAM/DCC OFF.
2. Set the WHITE BAL switch on the side panel to PRST.
3. Set the GAIN switch on the side panel to M (9 dB).
4. Set the MENU switch on the side panel to ON.
5. On the setting menu, set PAGE and ITEM as follows in the specified order:

	PAGE	ITEM
①	FUNCTION 1/2	TEST SAW → ON
②	LEVEL 3/9	WHITE CLIP → OFF
③		KNEE SLOPE
④		KNEE POINT

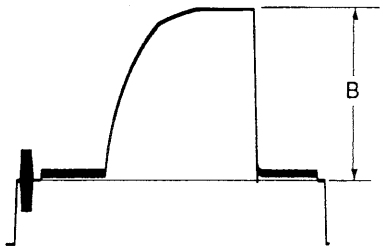
6. Under setting ③, minimize the knee slope by pressing the UP/DOWN button on the side panel (fully UP side).
7. Under setting ④, set the level of the knee point A to meet the following specification by pressing the UP/DOWN button on the side panel.
   A = 98 ±2 IRE (for NTSC model)
   A = 686 ±10 mV (for PAL model)
8. Under setting ③, set the level of the knee slope B to meet the following specification by pressing the UP/DOWN button on the side panel.
   B = 109 ±2 IRE (for NTSC model)
   B = 763 ±10 mV (for PAL model)
9. Set the GAIN switch on the side panel to H (18 dB).
10. On the setting menu, set PAGE and ITEM as follows in the specified order:

	PAGE	ITEM
⑤	LEVEL 3/9	WHITE CLIP → ON
⑥		WHITE CLIP LEVEL

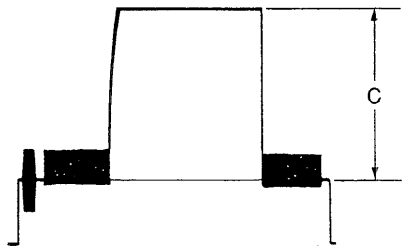
11. Under setting ⑥, set the white clip level C to meet the following specification by pressing the UP/DOWN button on the side panel.
    C = 109 ±2 IRE (for NTSC model)
    C = 763 ±10 mV (for PAL model)
12. On the setting menu, set PAGE and item as follows:
    PAGE: FUNCTION 1/2
    ITEM: TEST SAW → OFF



(Waveform monitor)



(Waveform monitor)



(Waveform monitor)

• Note

The values used in the above adjustment are for the conditions that the white clip level is set to 109 IRE. When the white clip level is set to a value other than 109 IRE, use the following table to set the levels of the knee point and knee slope. *(109 IRE→763 mV: PAL model)

	WHITE CLIP LEVEL (Unit: IRE/mV)			
	109/763	107/749	105/735	103/721
KNEE POINT	98/686	98/686	96/672	96/672
KNEE SLOPE	109/763	107/750	107/750	107/750
WHITE CLIP	109/763	107/750	105/735	103/721

5-4-9. Crispening Adjustment (16:9)

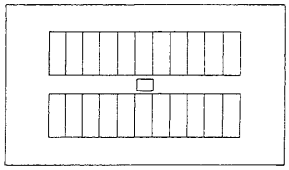
Screen mode	16:9

• Setting

Equipment	Waveform monitor	Board	

• Preparation

Connect a waveform monitor to the TEST OUT connector.
On the setting menu, set PAGE and ITEM as follows:
PAGE: FUNCTION 1/2
ITEM: DETAIL → ON
Then, set PAGE to LEVEL 1/9 and ITEM to DETAIL LEVEL.
Push up the MENU switch to CANCEL/PRST side four times to preset the data.
Shoot a gray-scale chart in the full underscan's picture frame by using the zoom lens.

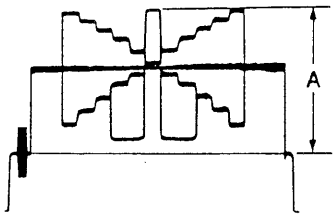


Monitor screen

• Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector
Object: Gray-scale chart (16:9)

1. While shooting the gray-scale chart, adjust the lens iris so that the level A is set as follow:
   A = 100 ±2 IRE (for NTSC model)
   A = 700 ±10 mV (for PAL model)



(Waveform monitor)

2. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 1/9 <16:9 MODE>
   ITEM: CRISPENING
3. Reduce the noise on the screen to a permissible level by pressing the UP/DOWN button on the side panel.

5-4-10. Level Dependent Adjustment (16:9)

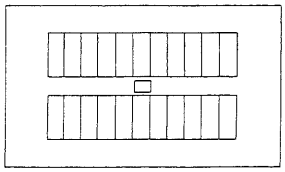
Screen mode	16:9

- Setting

Equipment	Waveform monitor	Board	

- Preparation

Connect a waveform monitor to the TEST OUT connector.
On the setting menu, set PAGE and ITEM as follows:
PAGE: FUNCTION 1/2
ITEM: DETAIL → ON
PAGE: TEST OUT
ITEM: ENC
Set the OUTPUT/DCC switch on the side panel to CAM/ON.
Shoot a gray-scale chart (16:9) in the full underscan's picture frame by using the zoom lens.

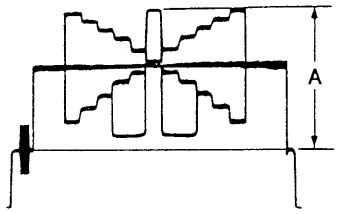


Monitor screen

- Adjustment procedure

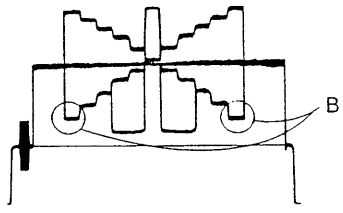
Adjustment point: Setting menu
Measurement point: TEST OUT connector
Object: Gray-scale chart (16:9)

1. While shooting the gray-scale chart, adjust the lens iris so that the level A is set as follow:
   A = 100 ±2 IRE (for NTSC model)
   A = 700 ±10 mV (for PAL model)



(Waveform monitor)

2. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 1/9 <16:9 MODE>
   ITEM: LEVEL DEPEND
3. Eliminate the detail signal from portion B by pressing the UP/DOWN button on the side panel.



(Waveform monitor)

- Note

After this adjustment, be sure to perform 5-4-11. H/V ratio adjustment (16:9), and 5-4-12. Detail level adjustment (16:9), in that order.

5-4-11. H/V Ratio Adjustment (16:9)

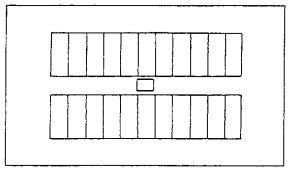
Screen mode	16:9

- Setting

Equipment	Waveform monitor	Board	

- Preparation

Connect a waveform monitor to the TEST OUT connector.
On the setting menu, set PAGE and ITEM as follows:
PAGE: FUNCTION 1/2
ITEM: DETAIL → ON
PAGE: TEST OUT
ITEM: ENC
Shoot a gray-scale chart (16:9) in the full underscan's picture frame by using the zoom lens.

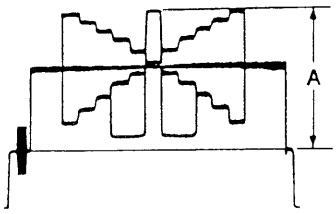


Monitor screen

- Adjustment procedure

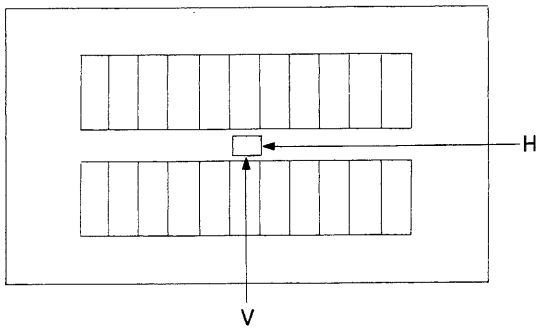
Adjustment point: Setting menu
Measurement point: TEST OUT connector
Object: Gray-scale chart

1. While shooting the gray-scale chart, adjust the lens iris so that the level A is set as follow:
   A = 100 ±2 IRE (for NTSC model)
   A = 700 ±10 mV (for PAL model)



(Waveform monitor)

2. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 1/9 <16:9 MODE>
   ITEM: V DTL LEVEL
3. Adjust the H and V detail amounts be added are equivalent by pressing the UP and/or DOWN button.



5-4-12. Detail Level Adjustment (16:9)

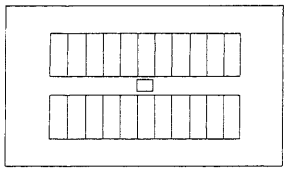
Screen mode	16:9

- Setting

Equipment	Waveform monitor	Board	

- Preparation

Connect a waveform monitor to the TEST OUT connector.
On the setting menu, set PAGE and ITEM as follows:
PAGE: FUNCTION 1/2
ITEM: DETAIL → ON
PAGE: TEST OUT
ITEM: ENC
Shoot a gray-scale chart (16:9) in the full underscan's picture frame by using the zoom lens.

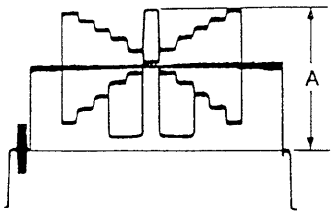


Monitor screen

- Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector
Object: Gray-scale chart (16:9)

1. While shooting the gray-scale chart, adjust the lens iris so that the level A is set as follow:
   A = 80 ±2 IRE (for NTSC model)
   A = 560 ±10 mV (for PAL model)



(Waveform monitor)

2. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 1/9 <16:9 MODE>
   ITEM: V DTL LEVEL
3. Set the desired level of the detail signal added to each step in the gray-scale chart by pressing the UP/DOWN button on the side panel.

5-4-13. Crispening Adjustment (4:3)

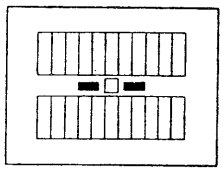
Screen mode	4:3

- Setting

Equipment	Waveform monitor	Board	

- Preparation

Connect a waveform monitor to the TEST OUT connector.
On the setting menu, set PAGE and ITEM as follows:
PAGE: FUNCTION 1/2
ITEM: DETAIL → ON
Then, set PAGE to LEVEL 1/9 and ITEM to DETAIL LEVEL.
Push up the MENU switch to CANCEL/PRST side four times to preset the data.
Shoot a gray-scale chart (4:3) in the full underscan's picture frame by using the zoom lens.

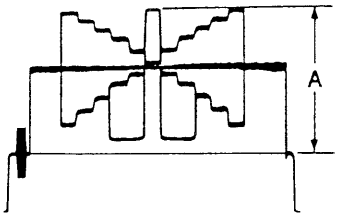


Monitor screen

- Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector
Object: Gray-scale chart (4:3)

1. While shooting the gray-scale chart, adjust the lens iris so that the level A is set as follow:
   A = 100 ±2 IRE (for NTSC model)
   A = 700 ±10 mV (for PAL model)



(Waveform monitor)

2. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 1/9 <4:3 MODE>
   ITEM: CRISPENING
3. Reduce the noise on the screen to a permissible level by pressing the UP/DOWN button on the side panel.

5-4-14. Level Dependent Adjustment (4:3)

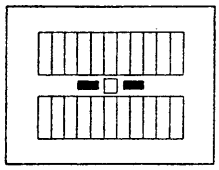
Screen mode	4:3

- Setting

Equipment	Waveform monitor	Board	

- Preparation

Connect a waveform monitor to the TEST OUT connector.
On the setting menu, set PAGE and ITEM as follows:
PAGE: FUNCTION 1/2
ITEM: DETAIL → ON
PAGE: TEST OUT
ITEM: ENC
Set the OUTPUT/DCC switch on the side panel to CAM/ON.
Shoot a gray-scale chart (4:3) in the full underscan's picture frame by using the zoom lens.

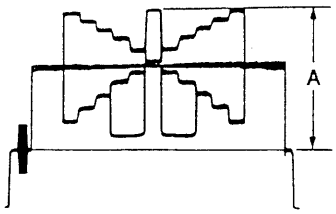


Monitor screen

- Adjustment procedure

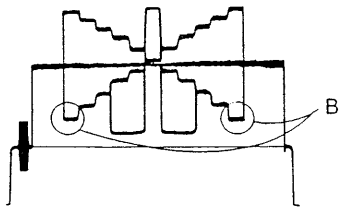
Adjustment point: Setting menu
Measurement point: TEST OUT connector
Object: Gray-scale chart (4:3)

1. While shooting the gray-scale chart, adjust the lens iris so that the level A is set as follow:
   A = 100 ±2 IRE (for NTSC model)
   A = 700 ±10 mV (for PAL model)



(Waveform monitor)

2. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 1/9 <4:3 MODE>
   ITEM: LEVEL DEPEND
3. Eliminate the detail signal from portion B by pressing the UP/DOWN button on the side panel.



(Waveform monitor)

- Note

After this adjustment, be sure to perform 5-4-15. H/V ratio adjustment (4:3), and 5-4-16. Detail level adjustment (4:3), in that order.

5-4-15. H/V Ratio Adjustment (4:3)

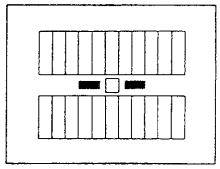
Screen mode	4:3

- Setting

Equipment	Waveform monitor	Board	

- Preparation

Connect a waveform monitor to the TEST OUT connector.
On the setting menu, set PAGE and ITEM as follows:
PAGE: FUNCTION 1/2
ITEM: DETAIL → ON
PAGE: TEST OUT
ITEM: ENC
Shoot a gray-scale chart (4:3) in the full underscan's picture frame by using the zoom lens.

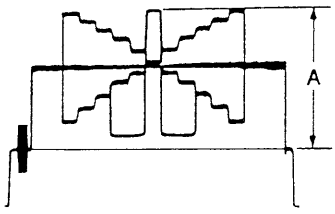


Monitor screen

- Adjustment procedure

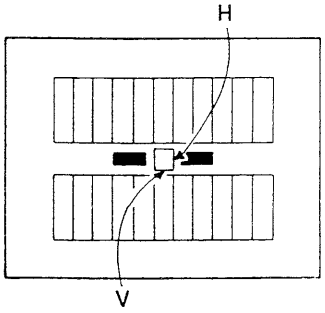
Adjustment point: Setting menu
Measurement point: TEST OUT connector
Object: Gray-scale chart (4:3)

1. While shooting the gray-scale chart, adjust the lens iris so that the level A is set as follow:
   A = 100 ±2 IRE (for NTSC model)
   A = 700 ±10 mV (for PAL model)



(Waveform monitor)

2. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 1/9 <4:3 MODE>
   ITEM: V DTL LEVEL
3. Adjust the H and V detail amounts be added are equivalent by pressing the UP and/or DOWN button.



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5-4-16. Detail Level Adjustment (4:3)

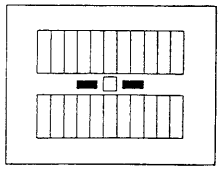
Screen mode	4:3

- Setting

Equipment	Waveform monitor	Board	

- Preparation

Connect a waveform monitor to the TEST OUT connector.
On the setting menu, set PAGE and ITEM as follows:
PAGE: FUNCTION 1/2
ITEM: DETAIL → ON
PAGE: TEST OUT
ITEM: ENC
Shoot a gray-scale chart (4:3) in the full underscan's picture frame by using the zoom lens.

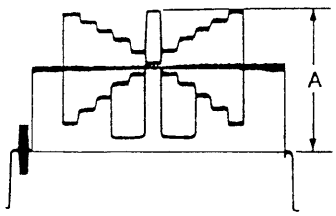


Monitor screen

- Adjustment procedure

Adjustment point: Setting menu
Measurement point: TEST OUT connector
Object: Gray-scale chart (4:3)

1. While shooting the gray-scale chart, adjust the lens iris so that the level A is set as follow:
   A = 80 ±2 IRE (for NTSC model)
   A = 560 ±10 mV (for PAL model)



(Waveform monitor)

2. On the setting menu, set PAGE and ITEM as follows:
   PAGE: LEVEL 1/9 <4:3 MODE>
   ITEM: V DTL LEVEL
3. Set the desired level of the detail signal added to each step in the gray-scale chart by pressing the UP/DOWN button on the side panel.

5-4-17. Skin Tone Adjustment

Screen mode	

- Setting

Equipment	Color monitor, miewfinder or Vectorscope	Board	

- Preparation

Shoot a person's face.
On the setting menu, set PAGE and ITEM as follows.
PAGE: FUNCTION 1/2
ITEM: SKIN TONE DTL → ON

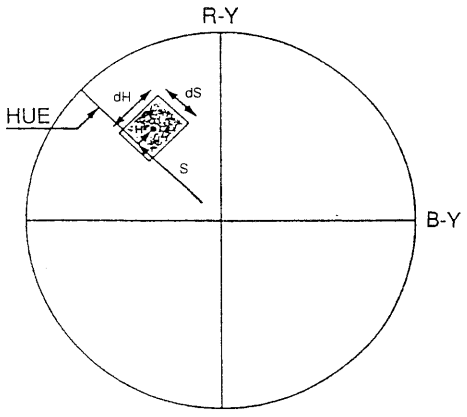
- Adjustment procedure

1. On the setting menu, set PAGE and ITEM as follows.
   PAGE: LEVEL 2/9
   ITEM: SKIN TONE IND. → ON
2. Adjustment point: Setting menu
   PAGE: LEVEL 2/9
   ITEM: SKIN TONE HUE: Adjust the picture hue
   HUE CENTER H
   HUE RANGE dH

   SAT CENTER S } Component in the saturation
   SAT RANGE dS } direction

   On the setting menu, set PAGE and ITEM as follows.
   PAGE: LEVEL 2/9
   ITEM: SKIN TONE DTL
   Adjust the amount of the Skin Detail signal using the UP and/or DOWN buttons.

   For reference
   The effective area of the Skin Detail signal appears as a zebra pattern for Skin Detail on the VF screen. Set the desired level.
   The effective area of the Skin Detail signal output as a monochrome signal from the TEST OUT/VIDEO OUT connectors. Set the desired level using the Color Monitor or Vectorscope. (The component of the Chroma signal in the setting area disappears on the Vectorscope screen.)



(Vectorscope Screen)

3. On the setting menu, set PAGE and ITEM as follows.
   PAGE: LEVEL 2/9
   ITEM: SKIN TONE IND. → OFF
   PAGE: FUNCTION 1/2
   ITEM: SKIN TONE DTL → OFF

5-4-18. Zebra Adjustment

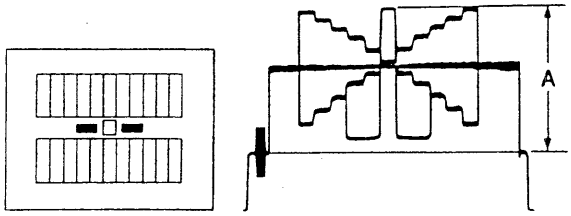
Screen mode	

- Setting

Equipment	Waveform monitor	Board	

- Preparation

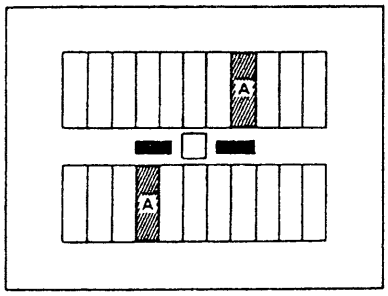
Set the ZEBRA switch, on the viewfinder to ON.
On the setting menu, set PAGE and ITEM as follows:
PAGE: TEST OUT
ITEM: ENC
Shoot a gray-scale chart in the full underscan's picture frame by using the zoom lens.
Adjust the lens iris so that the level A is set as follow:
A = 100 ±2 IRE (for NTSC model)
A = 700 ±10 mV (for PAL model)



Monitor screen Waveform monitor

- Adjustment procedure

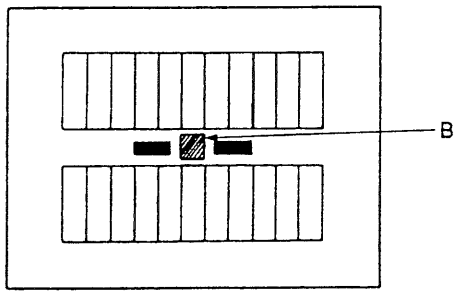
1. Adjustment point: Setting menu
PAGE: LEVEL 3/9
ITEM: ZEBRA 1 DETECT
Measurement point: Viewfinder
Specification: Set the condition that stripes appear at the center of portions A on the viewfinder screen, by pressing the UP/DOWN button on the side panel.



(Viewfinder screen)

2. On the setting menu, set PAGE and ITEM as follows:
PAGE: LEVEL 3/9
ITEM: ZEBRA2 → ON

3. On the setting menu, set PAGE and ITEM as follows:
PAGE: LEVEL 3/9
ITEM: ZEBRA2 DETECT
Specification: Set the condition that stripes appear at the center of portion B on the viewfinder screen, by pressing the UP/DOWN button on the side panel.



(Viewfinder screen)

4. On the setting menu, set PAGE and ITEM as follows:
PAGE: LEVEL 3/9
ITEM: ZEBRA2 → OFF

5-4-19. Automatic Iris Adjustment

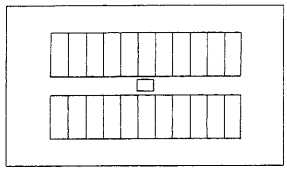
Screen mode	16:9

- Setting

Equipment	Waveform monitor	Board	

- Preparation

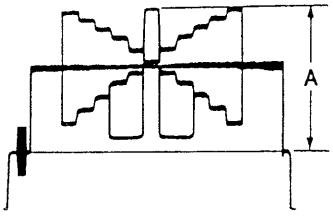
Set the OUTPUT/DCC switch on the side panel to CAM/ON.
On the setting menu, set PAGE and ITEM as follows:
PAGE: TEST OUT
ITEM: ENC
Set the lens AUTO/MANU switch to AUTO.
Shoot a gray-scale chart (16:9) in the full underscan's picture frame by using the zoom lens.
If the "16:9" chart is not kept on hand, it is acceptable to perform the adjustment at "4:3" mode using a "4:3" chart.



Monitor screen

- Adjustment procedure

1. Adjustment point: Setting menu
   PAGE: LEVEL 9/9
   ITEM: IRIS SET
   Specification: Adjust the lens iris so that the level A is set as follow:
   A = 100 ±2 IRE (for NTSC model)
   A = 700 ±10 mV (for PAL model)

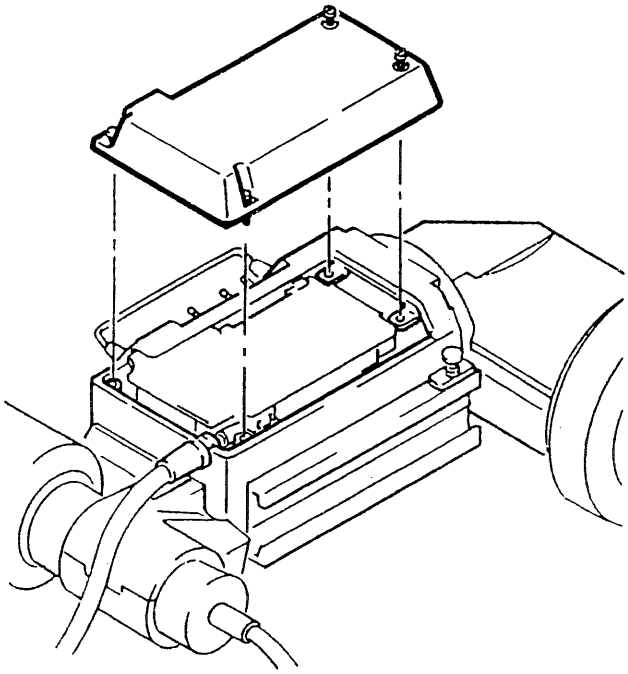


2. Adjustment point: Setting menu
   PAGE: LEVEL 9/9
   ITEM: IRIS MODE
   Measurement point: TEST OUT connector
   Specification: Set the automatic iris operation mode depending on the application. Press the DOWN button to set the mode to that in which the iris operates according to the peak-to-peak level of the video signal. Press the UP button to set the mode to that in which the iris operates according to the average level of the video signal.
3. Set the lens AUTO/MANU switch to MANU.
4. Set the OUTPUT/DCC switch on the side panel to CAM/OFF.
5. On the setting menu, set PAGE and ITEM as follows:
   PAGE: FUNCTION 2/2
   ITEM: FILTER INH → OFF
6. Set S1 on the AT-84 board to USER.

5-4-20. Viewfinder System Adjustment

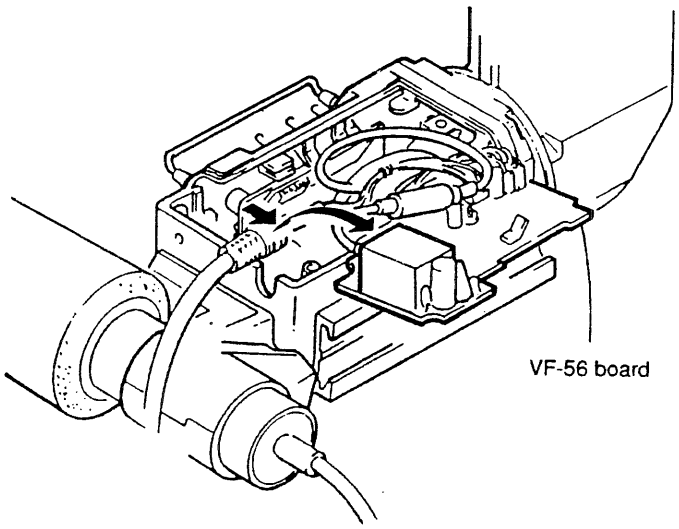
This adjustment should be performed after the camera is adjusted completely.

1. Turn OFF the main POWER switch (side panel) before adjustment.
2. Remove the viewfinder from the camera, then remove the VF cover.

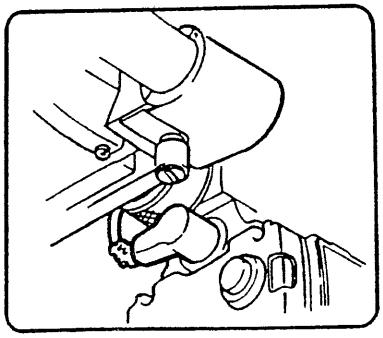


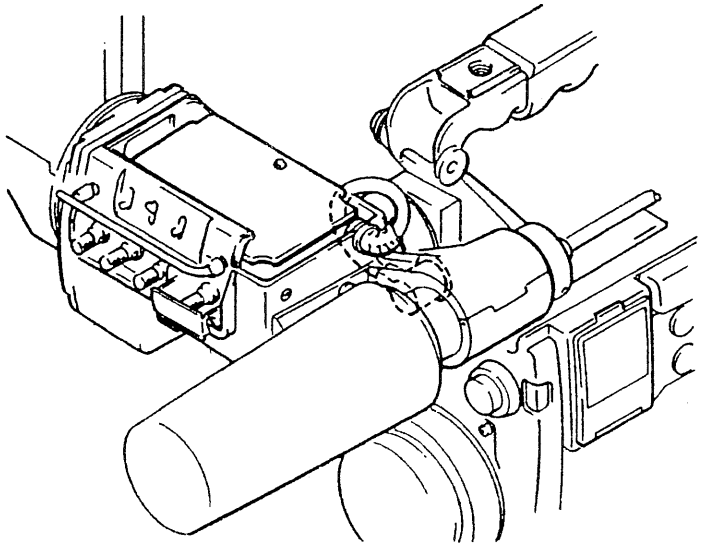
3. Turn the viewfinder upside down and install it to the camera.

4. As illustrated below, open the VF-56 board while moving it in the direction of the arrow and open the board so that the component side is placed to the upper position.



5. Turn the main POWER switch to ON.





I. Vertical Hold Adjustment

Screen mode	

- Setting

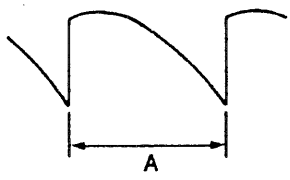
Equipment	Dualtrace oscilloscope	Board	VF-56 board

- Preparation

Extract the IF-443 board from the unit.
Set ⊘RV6 (V SIZE)/VF-56 to the mechanical center. (When ⊘RV6 is marked, it should not be turned.)

- Adjustment procedure

Measurement point: TP3/VF-56
GND E1/VF-56
Adjustment point: ⊘RV5 (V HOLD)/VF-56
Spec.: A = 20.4 ±0.5 ms



- Note

- After adjustment is completed, attach the IF-443 board to the unit.

II. Horizontal Hold Adjustment

Screen mode	

- Setting

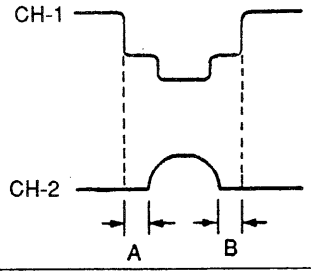
Equipment	Dualtrace oscilloscope	Board	VF-56 board

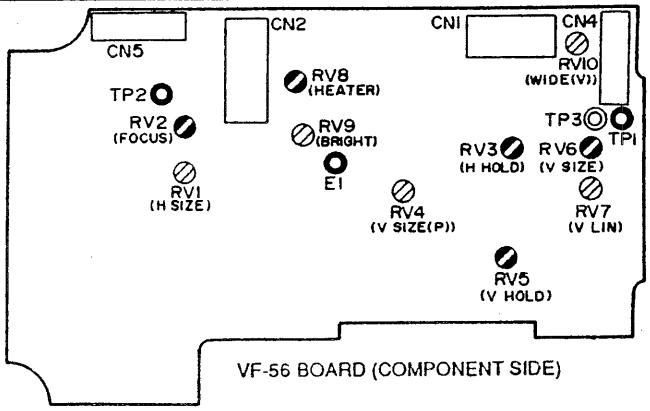
- Preparation

Shoot the fully occupied white area and set the white level to 100 ±2 IRE.

- Adjustment procedure

Measurement point: CH-1. TP2/VF-56
GND E1
CH-2. TP1/VF-56
GND E1
Adjustment point: ⊘RV3 (H HOLD)/VF-56
Spec.: A = B





Screen mode	

III. Bright Set Adjustment

- Setting

Equipment		Board	VF-56 board

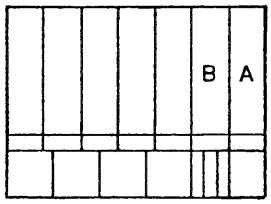
- Preparation

OUTPUT/DCC switch (side panel): BARS/OFF.
BRIGHT control (viewfinder): Fully turn counterclockwise. ↺
CONTRAST control (viewfinder): Fully turn clockwise. ↻

- Adjustment procedure

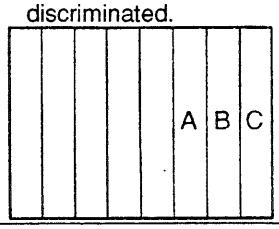
For NTSC model

Measurement point: Viewfinder
Adjustment point: ⊘RV9 (SUB BRIGHT)/VF-56
Spec.: Adjust ⊘RV9/VF-56 so that portions A and B on the viewfinder screen can be barely discriminated.



For PAL model

Measurement point: Viewfinder
Adjustment point: ⊘RV9 (SUB BRIGHT)/VF-56
Spec.: Adjust ⊘RV9/VF-56 so that portions A and B on the viewfinder screen can be barely discriminated, and portions B and C cannot be discriminated.



Screen mode	

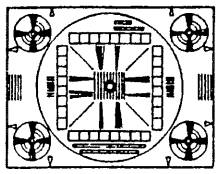
IV. Focus Adjustment

- Setting

Equipment		Board	VF-56 board

- Preparation

Shoot the resolution chart in a full picture frame.
Adjust the iris control so that the output level at the VIDEO OUT terminal is 100 ±2IRE.
Adjust the LENS FOCUS to the best focusing point on the black and white monitor.
Set the BRIGHT and CONTRAST controls of the viewfinder to the mechanical center positions.



(Viewfinder screen)

- Adjustment procedure

Measurement point: Viewfinder
Adjustment point: ⊘RV2 (FOCUS)/VF-56
Spec.: Gradually turn ⊘RV2 (FOCUS) on the VF-56 board from fully counterclockwise to clockwise, and adjust the best focus position. (RV should be turned slowly.)

- Note

After adjustment is completed, check that the focus operation can be performed irrespective of its BRIGHT and CONTRAST controls setting.

V. Picture Frame Adjustment

Screen mode	16:9 and 4:3

• Setting

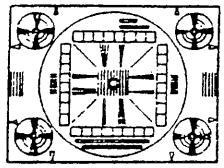
Equipment		Board	VF-56 board

• Note

IV. Focus adjustment and this adjustment affect each other. Repeat these adjustments until both specifications are met.

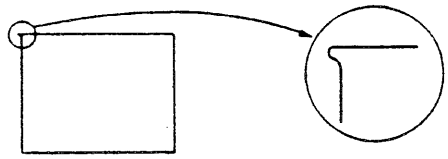
• Preparation

BRIGHT control (viewfinder): mechanical center.
CONTRAST control (viewfinder): mechanical center.
PEAKING control (viewfinder): mechanical center.
Shoot the resolution chart in the full underscan's picture frame by using the zoom lens.
On the setting menu, set PAGE and ITEM as follows:
PAGE: WIDE SCREEN
ITEM: 16:9/4:3 MODE → 4:3


Monitor screen

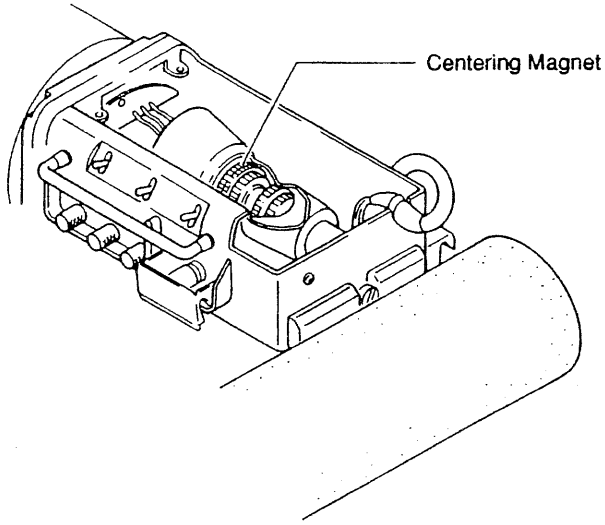
• Adjustment procedure

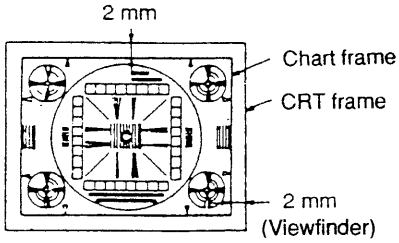
Step 1.
Measurement point: Viewfinder
Adjustment point: ⊘RV3 (H HOLD)/VF-56
Spec.: If the upper left corner of the picture is distorted, make right angle.



Step 2.
Measurement point: Viewfinder
Adjustment point: ⊘RV7 (V LIN)/VF-56
Spec.: Minimize the distortion of the four circles at the four corners of the resolution chart.

Step 3.
Measurement point: Viewfinder
Adjustment point: ⊘RV1 (H SIZE)/VF-56
⊘RV6 (V SIZE)/VF-56
⊘Centering magnet
Spec.: Adjust ⊘RV1 (H SIZE) and ⊘RV6 (V SIZE) so that the positions of the resolution chart are as shown below. Turn the centering magnet only when the left and lower corners cannot be adjusted.





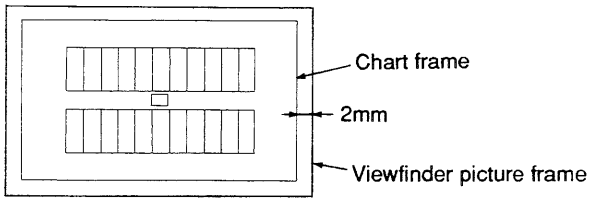
(To be continued)

Screen mode	16:9 and 4:3

• Adjustment procedure (continued from the previous page)

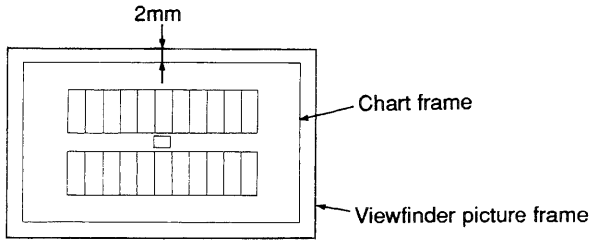
Step 4.
On the setting menu, set PAGE and ITEM as follows:
PAGE: WIDE SCREEN
ITEM: 16:9/4:3 MODE → 16:9

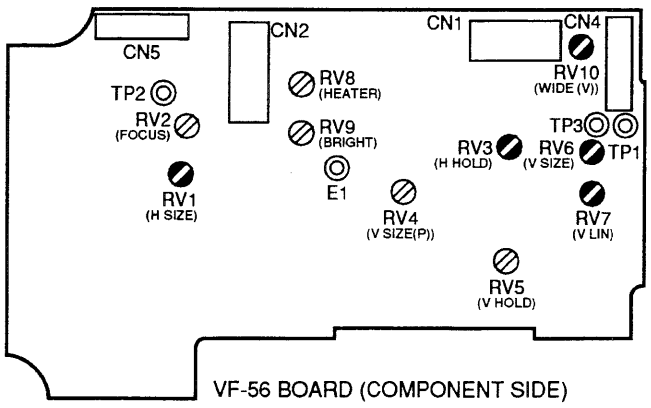
Step 5.
Shoot a gray-scale chart (16:9), and adjust by using the zoom lens as shown below.



Step 6.
Measurement point: Viewfinder
Adjustment point: ⊘RV10 (WIDE V SIZE)/VF-56
⊘Centering magnet
Spec.: Adjust and ⊘RV10 (WIDE V SIZE) so that the resolution chart is as shown below.

After adjustment is completed, close the VF-32 board.
Check that the picture is in the center of the viewfinder in the normal installing position on the unit.





• Note

When the paint-locked centering magnet is turned, paint-lock it again.

Screen mode	

VI. Heater Voltage Adjustmemt

- Setting

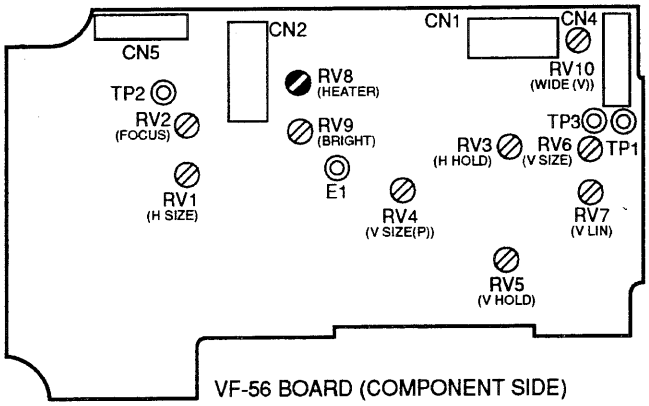
Equipment	Digital voltmeter	Board	VF-56 board

- Preparation

Extract the IF-443 board from the unit.
BRIGHT control (viewfinder): mechanical center.
CONTRAST control (viewfinder): mechanical center.

- Adjustment procedure

Measurement point: CN5-3 pin/VF-56
CN5-4 pin/VF-56
Adjustment point: ⊘RV8 (HEATER)/VF-56
Spec.: 700 ±10 mVdc



VF-56 BOARD (COMPONENT SIDE)

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SECTION 6
PERIODIC MAINTENANCE AND INSPECTION

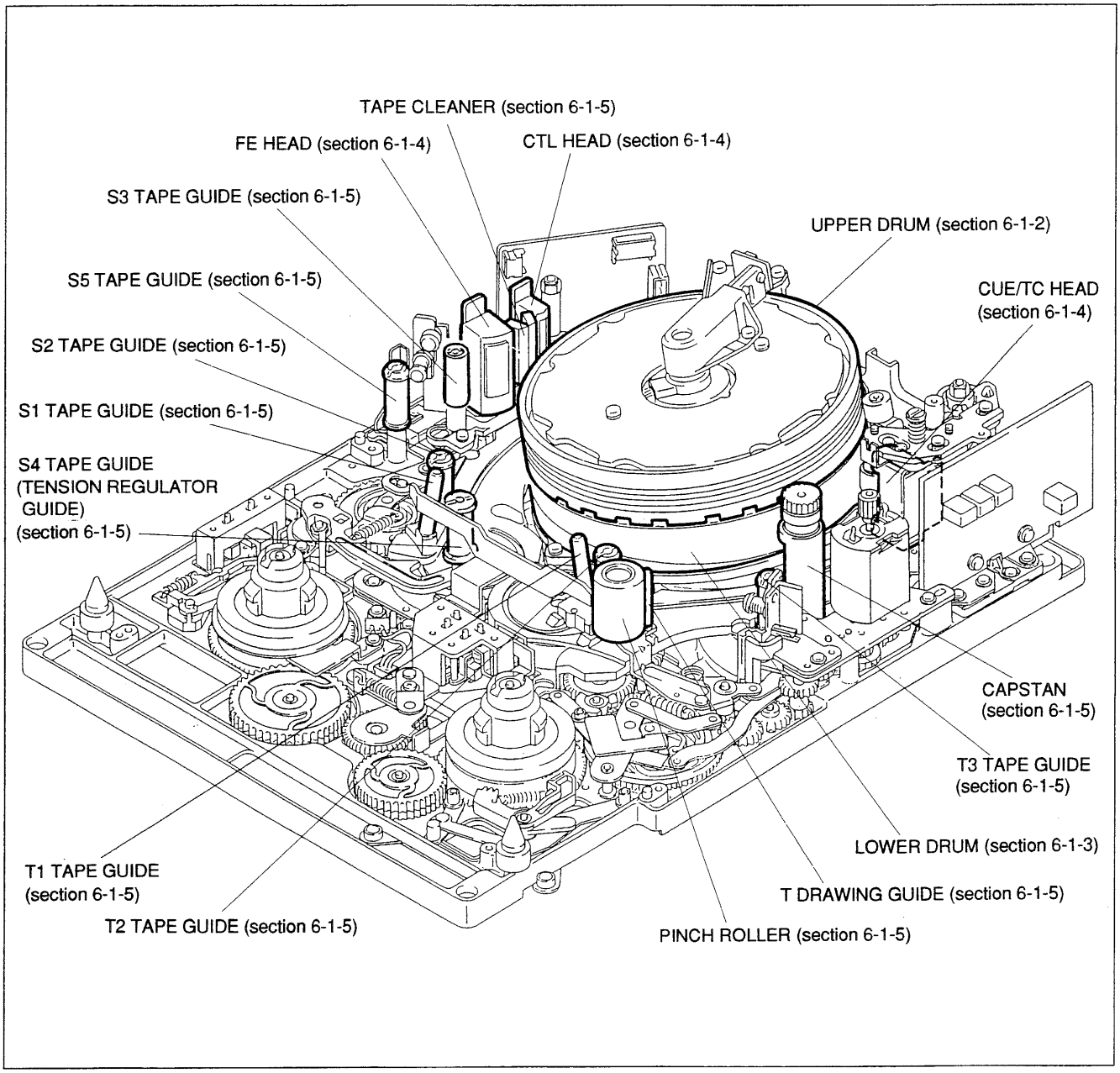
6-1. CLEANING

To make the most of the functions, fully realize the performances of this unit and to lengthen the life of the unit and tape, clean the parts often.

6-1-1. General Information for Cleaning

1. Index

In this section, explains the cleaning of parts as shown in the following figure.


TAPE CLEANER (section 6-1-5)
FE HEAD (section 6-1-4)
CTL HEAD (section 6-1-4)
S3 TAPE GUIDE (section 6-1-5)
UPPER DRUM (section 6-1-2)
S5 TAPE GUIDE (section 6-1-5)
CUE/TC HEAD (section 6-1-4)
S2 TAPE GUIDE (section 6-1-5)
S1 TAPE GUIDE (section 6-1-5)
S4 TAPE GUIDE (TENSION REGULATOR GUIDE) (section 6-1-5)
CAPSTAN (section 6-1-5)
T3 TAPE GUIDE (section 6-1-5)
LOWER DRUM (section 6-1-3)
T1 TAPE GUIDE (section 6-1-5)
T DRAWING GUIDE (section 6-1-5)
T2 TAPE GUIDE (section 6-1-5)
PINCH ROLLER (section 6-1-5)

2. Notes

- Be sure to turn the power off before cleaning.
- The blocks in the mechanical deck consist of the precision parts, and adjust precisely. Be careful not to damage the parts, and not to apply an excessive force during cleaning.
- Do not touch the greased portions during cleaning. If grease attaches to a cleaning cloth, replace the cleaning cloth by new one. If the cleaning cloth smeared with grease used, grease may attach to the places where it should not.
- Do not insert a cassette tape before cleaning fluid completely evaporates.

3. Preparations

(1) Turn the power off.
(2) Remove the front lid and the outside panel. (Refer to section 1-5.)

6-1-2. Cleaning of Tape Running Surface of Upper Drum and Video Heads

Notes

The upper drum and video heads are the parts that can damage easily. Take care not to damage the upper drum and rotary heads during cleaning.

Tools

- Cleaning cloth: 3-184-527-01
- Cleaning fluid: 9-919-573-01

Note

Never use a cotton swab.

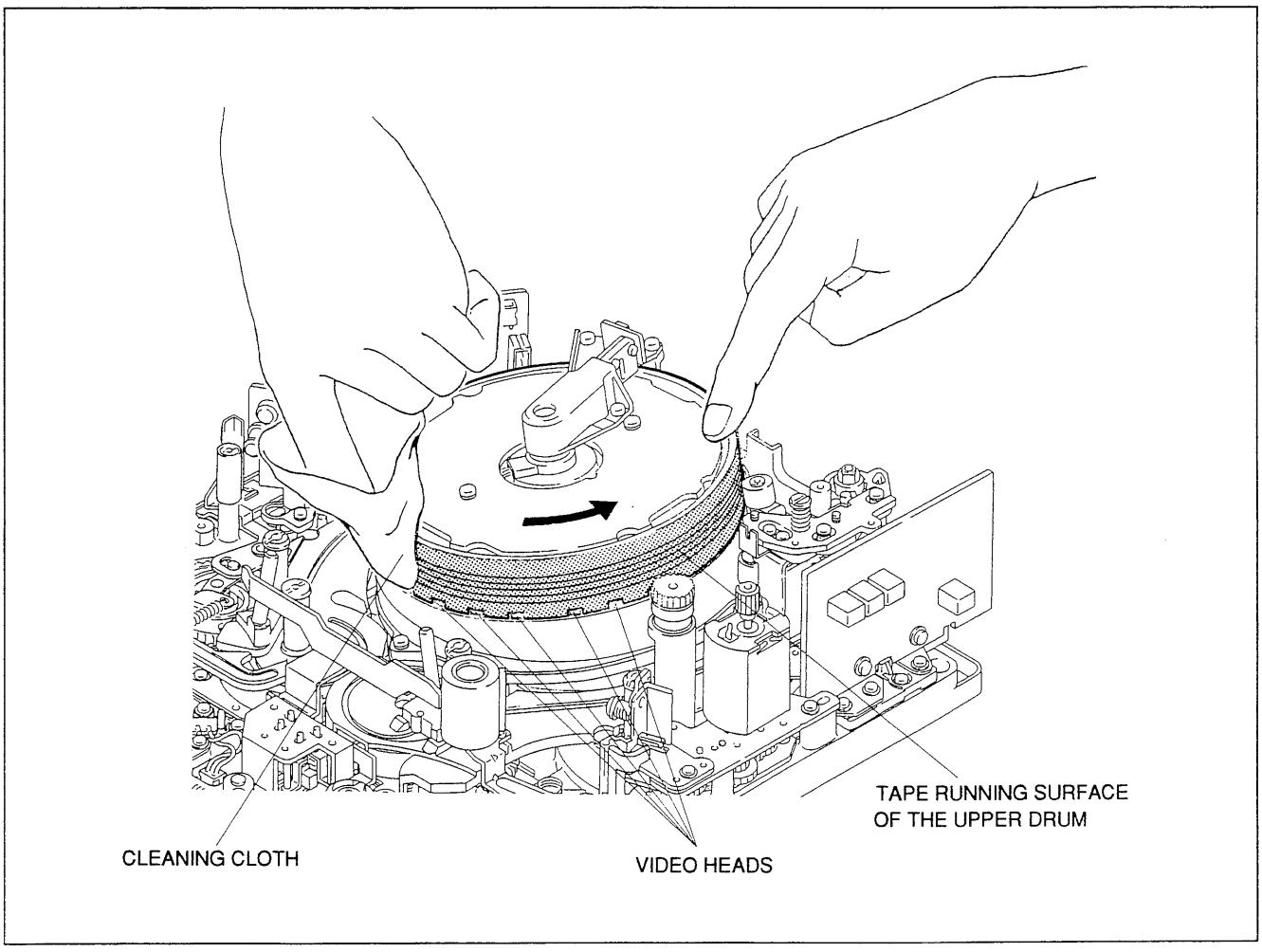
Procedures

1. Press a cleaning cloth moistened with cleaning fluid slightly against the video heads, and rotate the upper drum slowly counterclockwise.
2. Press a cleaning cloth moistened with cleaning fluid slightly against the tape running surface of the upper drum (shaded portion) as shown in the figure.

   Note

   Be sure to rotate the upper drum counterclockwise. Be sure to clean the rotary heads along the circumference. (Do not clean the video heads in the vertical direction. This may damage them.)

3. After cleaning, wipe the rotary heads using a dry cleaning cloth.



6-1-3. Cleaning of Tape Running Surface of Lower Drum and Lead Surface

Notes

Take care not to damage the lower drum (specially lead surface) during cleaning. Take care to clean the edge portion above the lower drum because it is near the video heads.

Tools

- Cleaning cloth: 3-184-527-01
- Cleaning fluid: 9-919-573-01
- Skewer or an equivalent (A metallic skewer can not use.)

Procedures

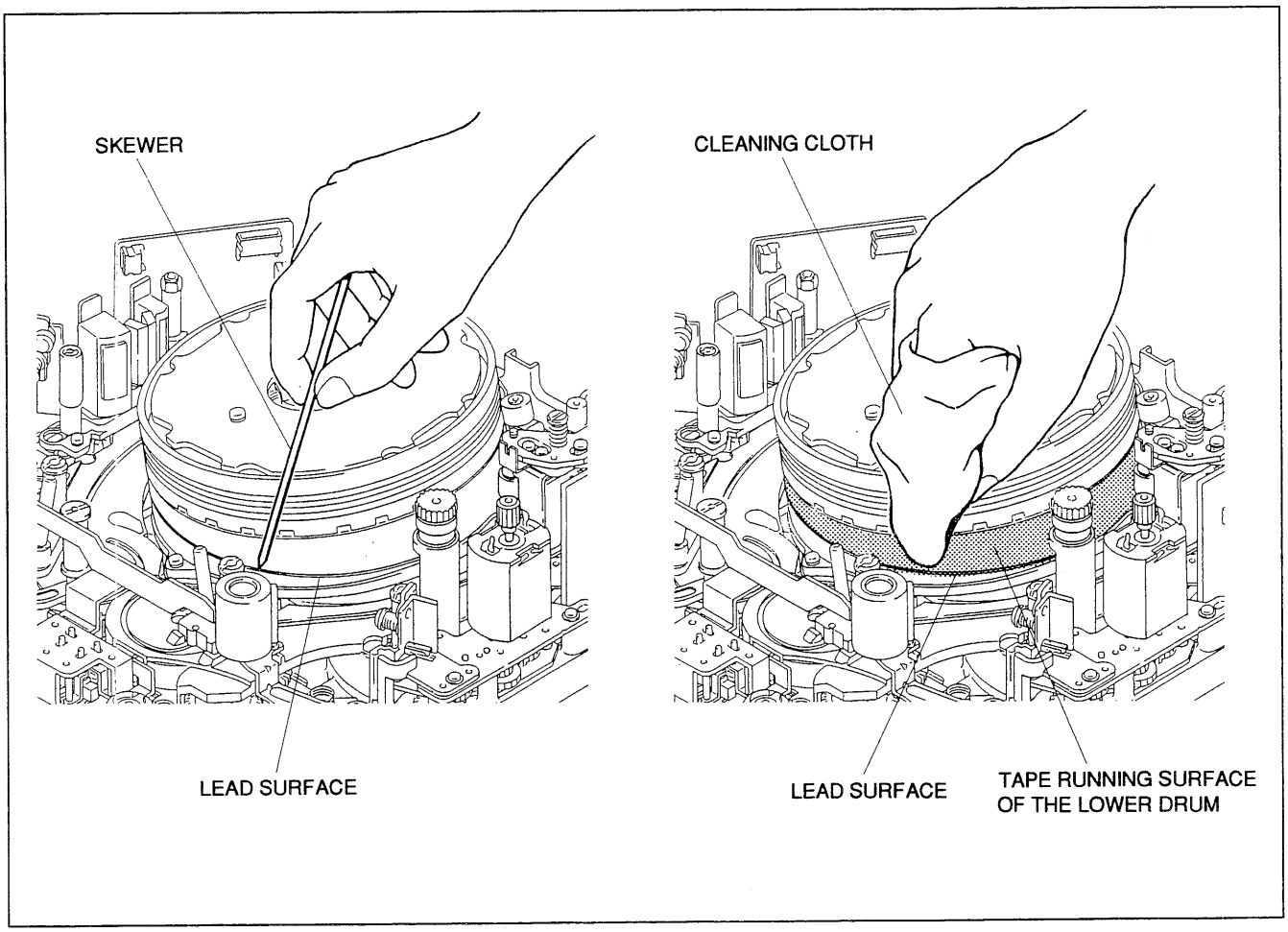
1. Put a skewer (or an equivalent) along the drum lead surface and remove magnetic powder as shown in the figure.

   Notes

   (a) Do not use a metallic skewer instead of a skewer. This may damage the tape running surface.
   (b) If the magnetic powder attached to the drum lead surface, tracking may badly influence. Remove the magnetic powder completely.

2. Clean the tape running surface of the lower drum and lead surface (shaded portion) using a cleaning cloth moistened with cleaning fluid as shown in the figure.

3. After cleaning, be sure to wipe the tape running surface of the lower drum and lead surface using a dry cleaning cloth.



6-1-4. Stationary Heads Cleaning

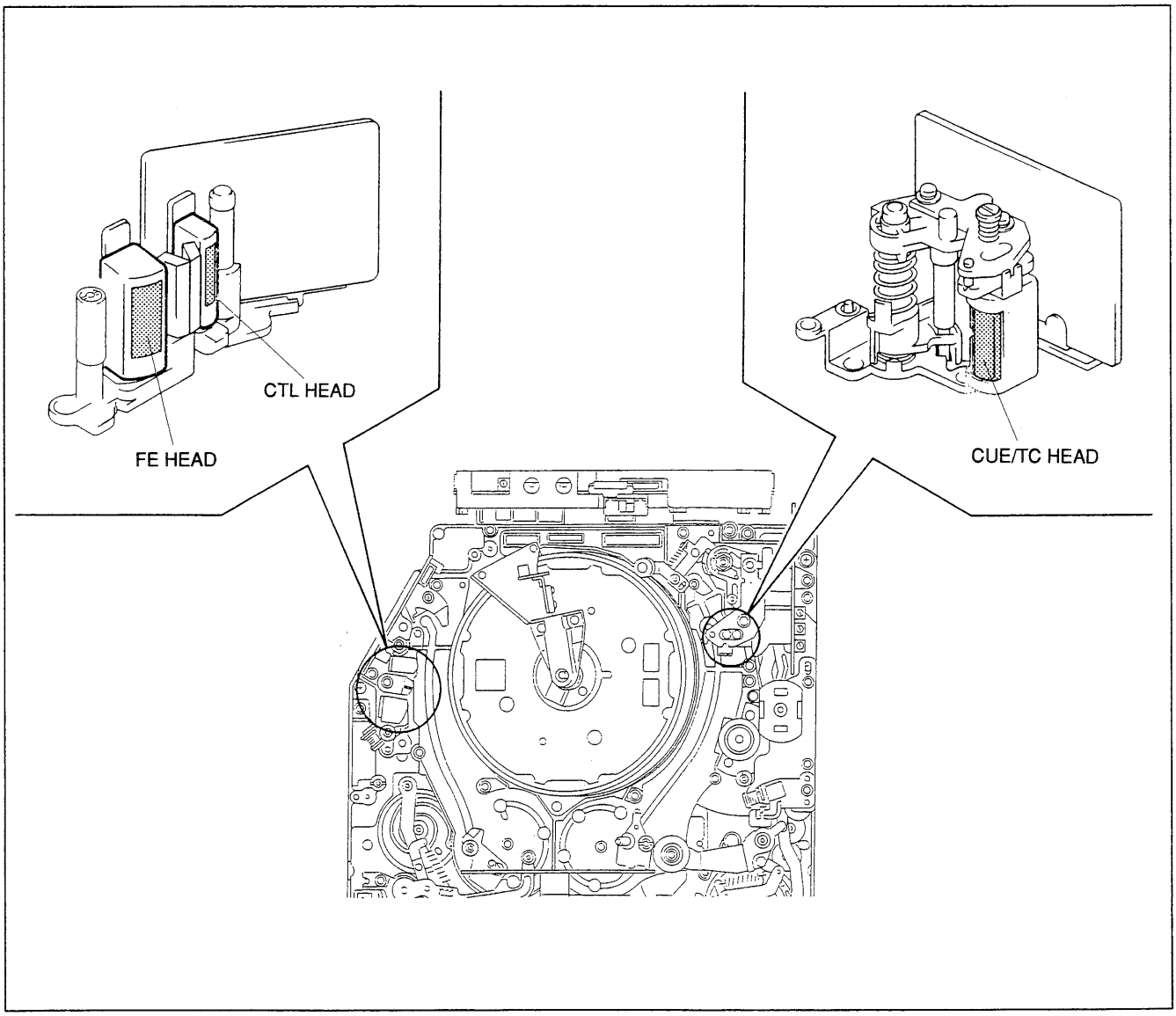
Note
Take care not to damage the surfaces of the stationary heads when cleaning.

Tools
- Cleaning cloth: 3-184-527-01
- Cleaning fluid: 9-919-573-01

Procedures
1. Clean the tape running surfaces of the FE, CTL and CUE/TC heads in the vertical direction using a cleaning cloth moistened with cleaning fluid.

   Notes
   If the magnetic powder attached to the head gap portions of the FE, CTL and CUE/TC heads, an error may occur when the recording or playback. Remove the magnetic powder completely.

2. After cleaning, be sure to wipe the tape running surfaces of the FE, CTL and CUE/TC heads using a dry cleaning cloth.



6-1-5. Cleaning of Tape Running System and Tape Cleaner

Notes

Tape cleaner has a sharp edge. Never touch the edge by bare hands. Take care to clean.

Tools

- Cleaning cloth: 3-184-527-01
- Cleaning fluid: 9-919-573-01

Procedures

1. Clean the tape running surfaces (shaded portions) of the following guides and the edge portion of the tape cleaner using a cleaning cloth moistened with cleaning fluid as shown in the figure.

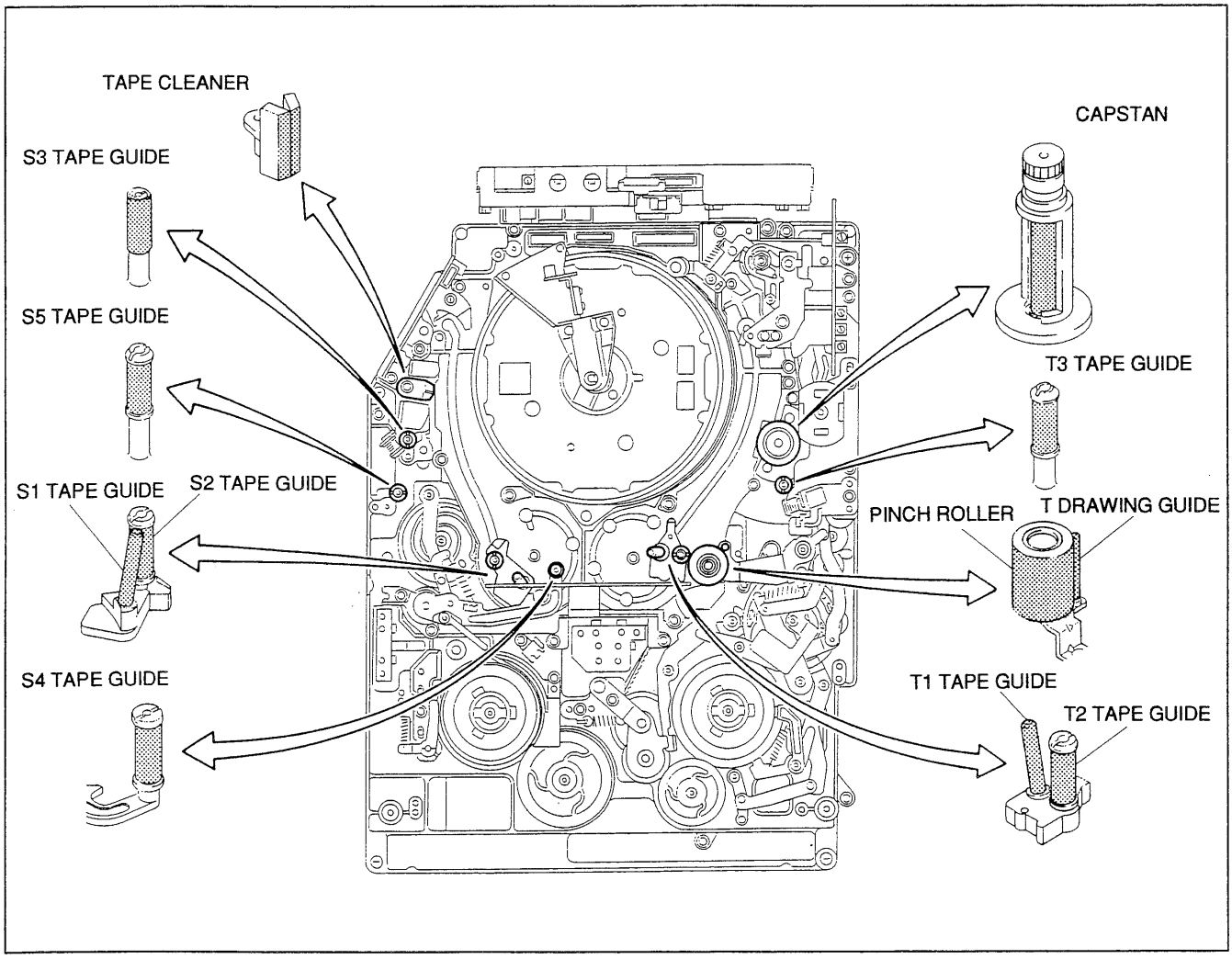
   S1 guide, S2 guide, S3 guide, S4 guide, S5 guide, T1 guide, T2 guide, T3 guide, T drawer guide, capstan and pinch roller

   Note

   Never touch the edge portion of the tape cleaner by bare hands.

2. Clean the gap of the tape cleaner that cloggs with the magnetic powder using a paper (or equivalent).

3. After cleaning, be sure to clean the tape running surfaces of the above guides and the edge portion of the tape cleaner using a dry cleaning cloth.



6-2. PERIODIC CHECK

To make the most of the functions, fully realize performances of the unit, and to lengthen the life of the unit and tape, a periodic check is recommended.

6-2-1. Hours Meter

This unit can display an hours meter on the view finder, and reset the your requested hours meter.
It is recommendable to carry out the periodic check using this hours meter as a reference.

1. Display procedures

(1) Press the DIAGNOSTIC switch on the side panel to enter the DIAGNOSTIC mode using the tip of a clip.
(2) The view finder changes every pressing the SHIFT button on the side panel.
(3) Press the DIAGNOSTIC switch on the side panel to exit the DIAGNOSTIC mode.

2. Customer reset

The hours meters of "5. DRUM RUN-2", "6. TAPE RUN-2", "7. OPERATION-2" and "8. THREADING-2" can reset by a customer.

(1) While checking on the LCD display, select the your requested hours meter by pressing the SHIFT button on the side panel.
(2) Press the RESET button on the side panel, and the total time of the your selected hours meter will reset .

3. Contents of display

Mode		Description
LCD display (Blinking)	View Finder	
01 XXXH 02 XXXH 03 XXXH 04 XXX 05 XXXH 06 XXXH 07 XXXH 08 XXX	-SELF DIAG. START- ↓ After 2 seconds VTR MENU-1 HOURS METER 1. DRUM RUNNING _XXXH 2. TAPE RUNNING _XXXH 3. OPERATION _XXXH 4. THREADING _XXX 5. DRUM RUN-2 _XXXH 6. TAPE RUN-2 _XXXH 7. OPERATION-2 _XXXH 8. THREADING-2 _XXX	1. Total hours when the drum rotates (Display of the time by an hour) 2. Total hours when the tape runs (Display of the time by an hour) 3. Total hours when the power of the unit is on (Display of the time by an hour) 4. Total number of threading time (Display of the threading and unthreading times) 5. Hours when the drum rotates (Customer-resetable) 6. Hours when the tape runs (Customer-resetable) 7. Hours when the power of the unit is on (Customer-resetable) 8. Number of threading time (Customer-resetable)

6-2-2. Periodic Check List

The replacement time which show in the following list are not the guarantee term parts. Use this list as guidelines for the maintenance and inspection. The replacement time of the parts vary depending on the operation environment and conditions of the unit

Note

The parts marked with " ↓ " replace, and at the same time the part under them replaces.

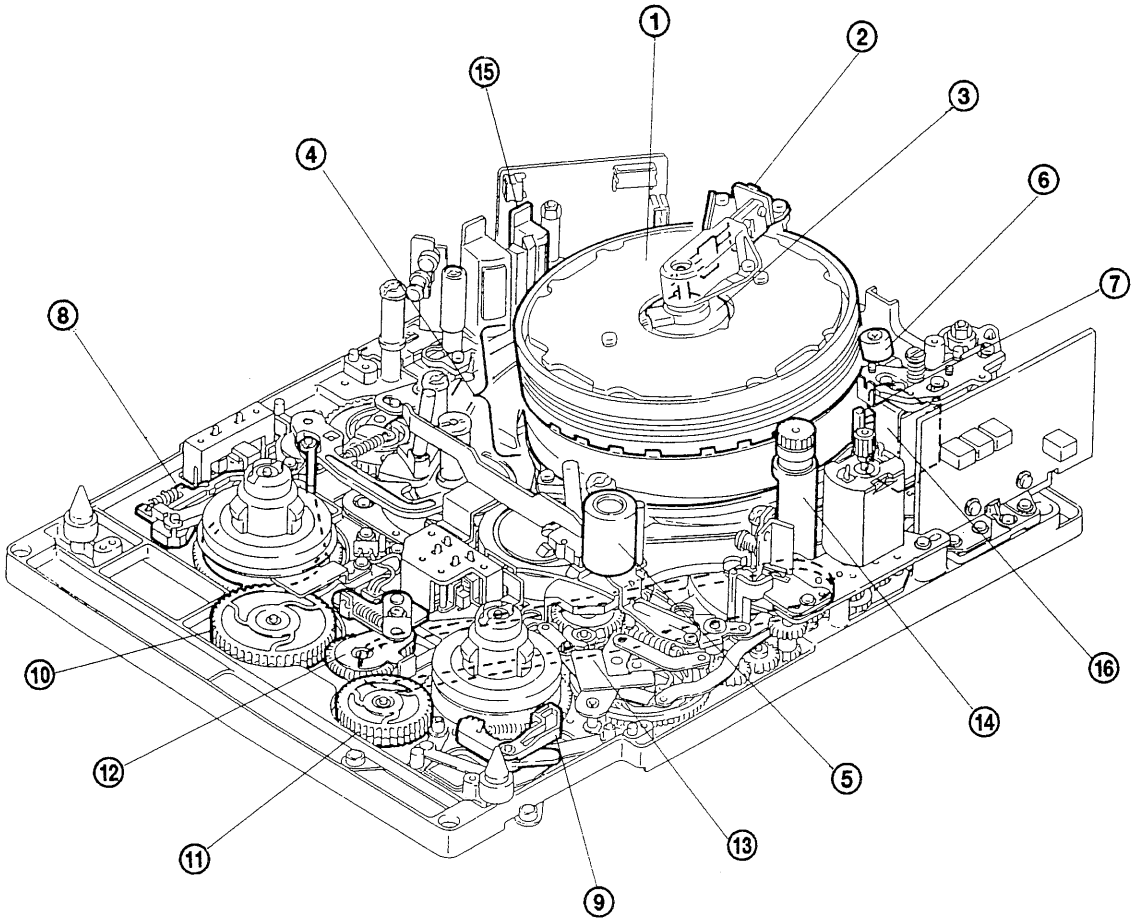
MODE A: DRUM RUNNING METER
MODE B: TAPE RUNNING METER

☆ : Replacement ◇ : Check

No	Item	MODE	Inspection Hours(h)								Replacement Parts	
			500	1000	1500	2000	2500	3000	3500	4000	Part Name	Part No.
1	Upper Drum Assembly	A	☆	☆	☆	☆	☆	↓	☆	☆	UPPER DRUM ASSY DJR-09-R (for NTSC) DJR-10-R (for PAL)	 A-8263-641- A-8263-624-
2	Brush Assembly for Slip Ring	A	—	☆	—	☆	—	↓	—	☆	BRUSH ASSY (RP)	A-8263-856-
3	Slip Ring Assembly	A	—	☆	—	☆	—	↓	—	☆	SLIP RING ASSY (RP)	A-8263-855-
4	Drum Assembly	A	—	—	—	—	—	☆	—	—	DRUM ASSY DJH-09A-R (for NTSC) DJH-10A-R (for PAL)	 A-8263-628- A-8263-623-
5	Pinch Roller	B	☆	☆	☆	☆	☆	☆	☆	☆	PINCH ROLLER ASSY	X-3676-032-
6	HC Roller for Video Head	A	☆	☆	☆	☆	☆	☆	☆	☆	HC ROLLER ASSY	X-3678-158-
7	Cleaning Brush for CUE Head	A	—	☆	—	☆	—	☆	—	☆	CUE BRUSH	3-681-778-
8	Tension Regulator Band Assembly	B	—	☆	—	☆	—	☆	—	☆	TENSION REGULATOR BAND ASSY	X-3678-114-
9	T Soft Brake Assembly	B	—	☆	—	☆	—	☆	—	☆	T SOFT BRAKE ASSY	X-3678-096-
10	S Idler Assembly	B	—	☆	—	☆	—	☆	—	☆	S IDLER ASSY	A-8278-142-
11	T Idler Assembly	B	—	☆	—	☆	—	☆	—	☆	T IDLER ASSY	A-6740-091-
12	Swing Gear Assembly	B	—	☆	—	☆	—	☆	—	☆	GEAR ASSY	A-8278-034-
13	Timing Belt	B	—	—	—	—	—	☆	—	—	TIMING BELT	3-679-723-01
14	Capstan Motor	B	—	—	—	—	—	☆	—	—	CAPSTAN MOTOR SCV-0701A	8-835-513-01
15	CTL Head	B	—	—	—	—	—	☆	—	—	CTL HEAD PS244-21D	8-825-779-71
16	CUE Head	B		◇:3000H				☆:6000H			CUE HEAD PS244-2103L	8-825-779-61

- Check sometimes the deformation of the eye cap of the view finder, and the reduction of the emission current of the CRT. Replace them as necessary.
- Replace the lithium battery on the TC-75 board every five years.

	Q'ty	Procedure
	1	Section 7-2-1
	1	Section 7-2-2
	1	Section 7-2-3
	1	Section 7-2-4
	1	Section 7-2-5
	1	Section 7-2-6
	1	Section 7-2-7
	1	Section 7-2-8
	1	Section 7-2-9
	1	Section 7-2-10
	1	Section 7-2-10
	1	Section 7-2-11
	1	Section 7-2-12
	1	Section 7-2-13
	1	Section 7-2-14
	1	Section 7-2-15



6-3. CARES AFTER USING AT SPECIAL ENVIRONMENT

It is recommended to check the following items after gathering the news at seaside or dust area.

1. Clean off sand and other dust in the unit carefully.
2. Clean the video heads, upper and lower drums and stationary heads.
3. Clean the tape running surfaces (tape guides, capstan shaft and pinch roller).
4. Clean the connectors on the connector panel.
5. Carry out the common operation check (recording or playback) and check that the unit has not an abnormal sound or operation.

If the unit has an abnormal condition, please contact your Sony dealer.

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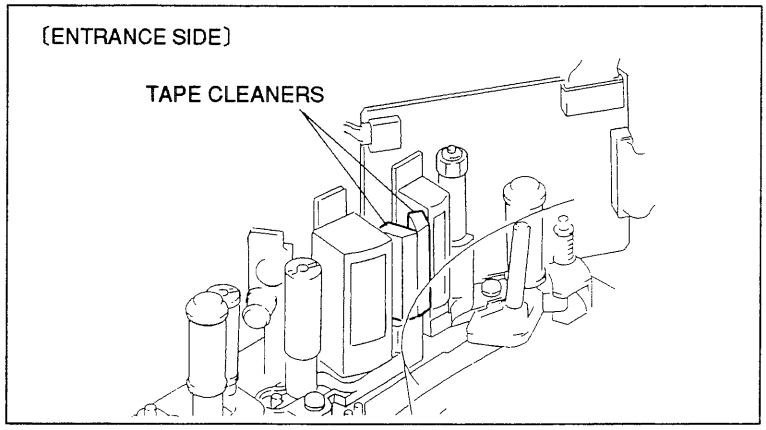
SECTION 7
REPLACEMENT OF PERIODIC MAINTENANCE PARTS

7-1. GENERAL INFORMATION FOR PARTS REPLACEMENT AND ADJUSTMENT

7-1-1. Notes

1. About tape cleaner

Never touch to the tape cleaner that attaches to the entrance head assembly with bare hand.



It is in danger of cutting your finger because the tape cleaner has a sharp edge. When replacing or adjusting the parts around the tape cleaner, take care it.

2. About tools

- Before using a tool, be sure to clean the surface of it.
  - Cleaning cloth : 3-184-527-01
  - Cleaning fluid : 9-919-573-01

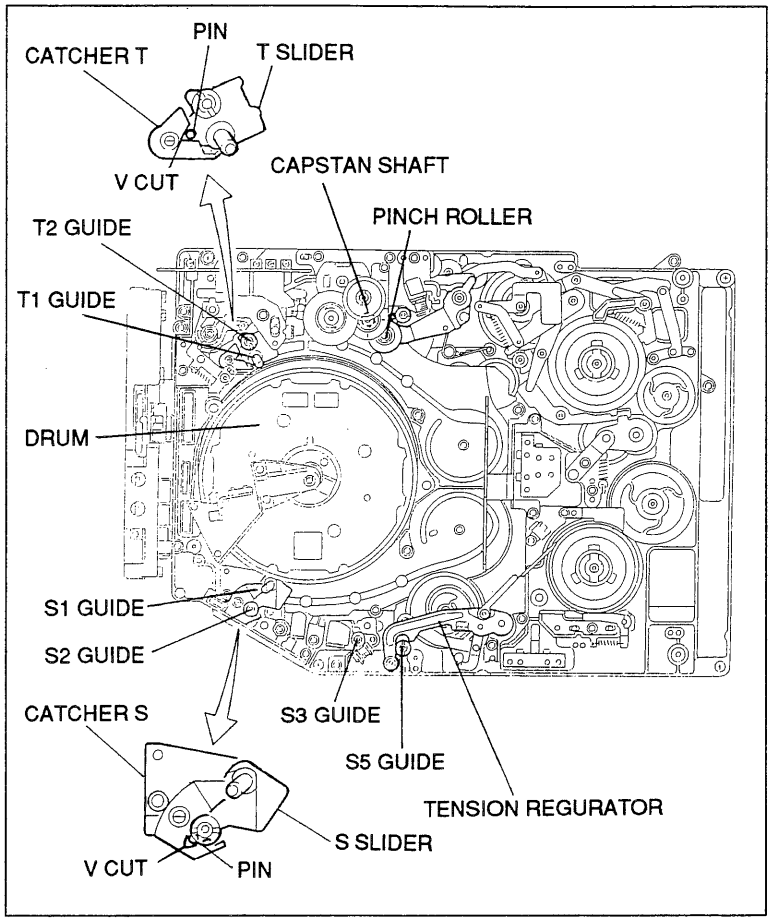
- Take care not to scratch the tool when using it.
  If scratching the tool, the adjustment can not correctly carry out.

7-1-2. Threading End/Unthreading End Mode

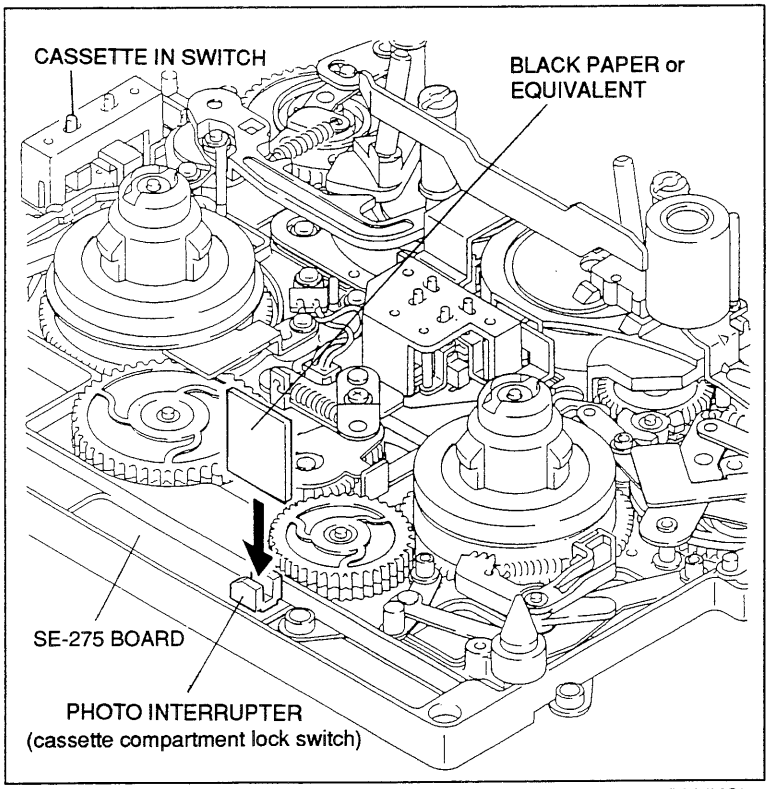
1. Threading end mode

Threading end mode means that S and T sliders move from around the reel tables to both sides of the drum, and stop at the cut portions like a V of catchers S and T.

(1) Selection procedures into the threading end mode with a tape
- Insert a cassette tape in the cassette compartment.
- Close the front lid.



(2) Selection procedures into the threading end mode without a tape
- Place the cassette compartment into the down state.
  (When the cassette compartment does not attach to the unit, interrupt the cassette compartment lock switch (photo interrupter) on the SE-275 board using a black paper or equivalent.)
- Press the cassette in switch about 1 second in this state.



2. Unthreading end mode

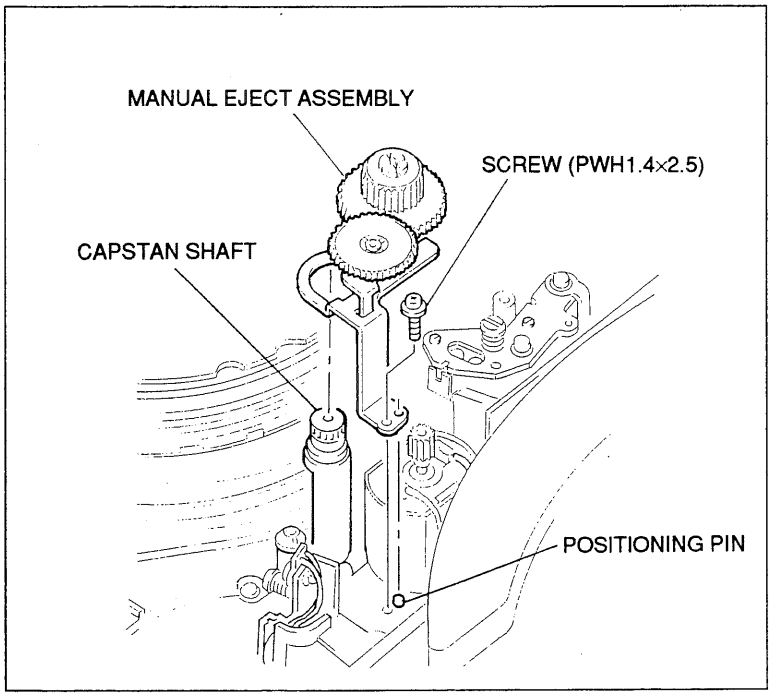
Unthreading end mode means that the S and T sliders move from the catchers S and T to the directions of the reel tables, and stop.
The unthreading end mode is the same as the ST/BY mode. If selecting the unit into this mode, the cassette compartment will raise up.

(1) Selection procedure into the unthreading end mode
- Press the EJECT button.

7-1-3. Manual Eject Assembly Removal/Installation

Removal

(1) Turn the power off.
(2) Remove the front lid and the outside panel. (Refer to 1-5.)
(3) Remove the screw and the manual eject assembly.

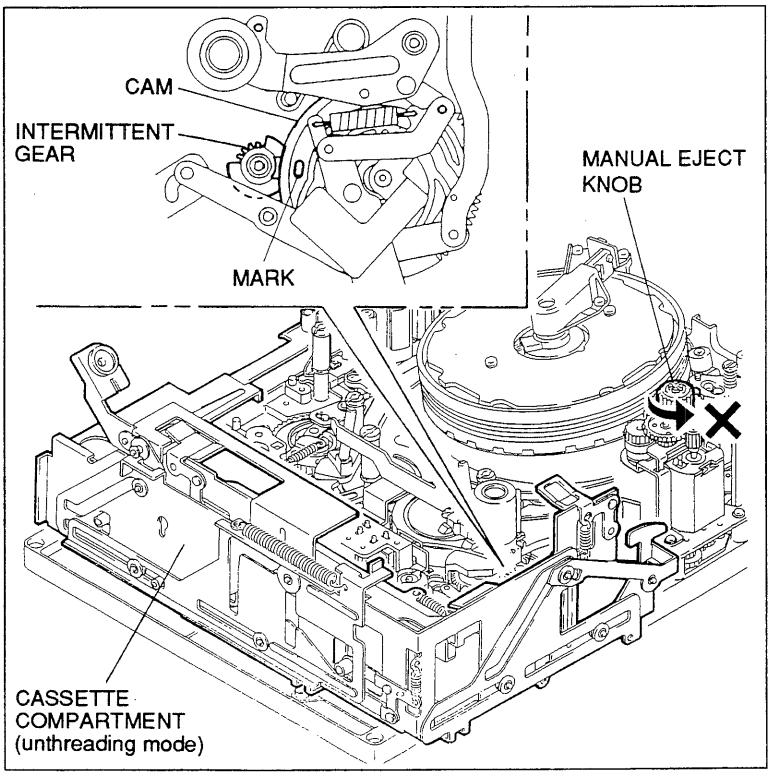


Installation

(1) Path the big hole of the manual eject assembly through the capstan shaft.
(2) Tighten the screw.
9×10^{-2} N•m (0.9 kgf•cm)
(3) While pressing down the knob of the manual eject assembly, turn it in the direction or reverse direction of the arrow. When turning it, check that the gears correctly engage and turn.

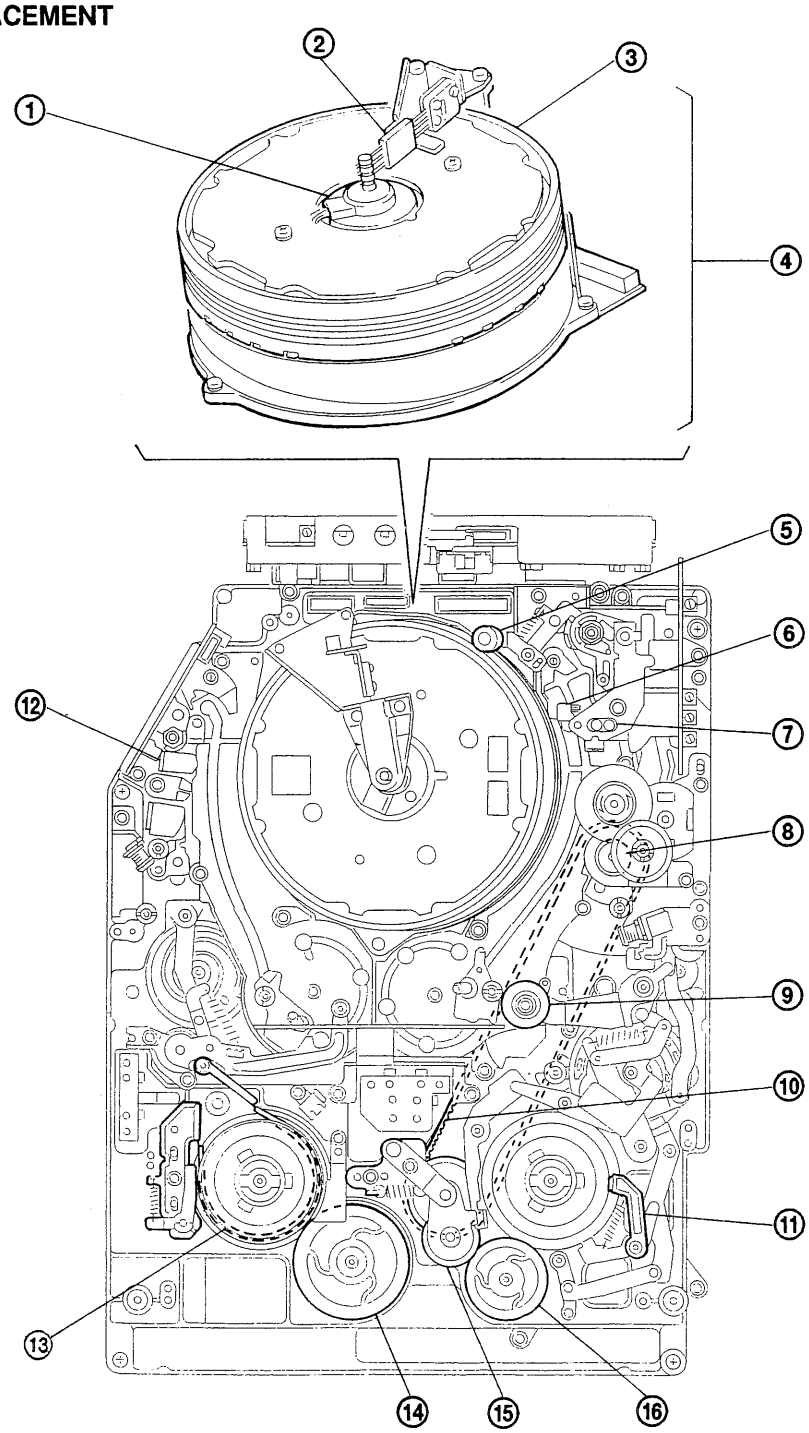
Notes

- After the cassette compartment raised up, do not keep on turning the manual eject knob counterclockwise.
  If keep on turning it, the component parts of the unit will break.
  When the marking on the cam is at position shown in the figure, never turn the manual eject knob counterclockwise.
- When closing the front lid after using the manual eject knob, be sure to turn the power on.



7-2. PARTS REPLACEMENT

1. Index



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2. Notes

(1) About screwdriver and torque reading

This model uses the screws of the two kinds.
Be sure to use the relevant tools when loosening or tightening.
Be sure to use the torque screwdriver when tightening the screw, and tighten in the relevant torque reading.

Torque screwdriver bit (for M1.4) : J-6325-110-A
Torque screwdriver bit (for M2) : J-6325-380-A
Hexagon bit (across 1.5 mm) : J-6326-120-A
Torque screwdriver (for 3 kg) : J-6325-400-A

Torque reading

mark means "fastening torque" on this manual. For example,

9×10^{-2} N•m (0.9 kgf•cm) indicates "fastening torque is 9×10^{-2} N•m (0.9 kgf•cm)".

For information, among them:

for M1.4 (+) screw : 9×10^{-2} N•m (0.9 kgf•cm)
for M2 (+) screw : 19×10^{-2} N•m (1.9 kgf•cm)
for hexagon screw : 19×10^{-2} N•m (1.9 kgf•cm)

References:This model uses the small size screws.When removing or attaching, the screw may fall in the unit.To prevent from the falling, it recommends that the bit of the screwdriver magnetizes.

(2) About stop washer

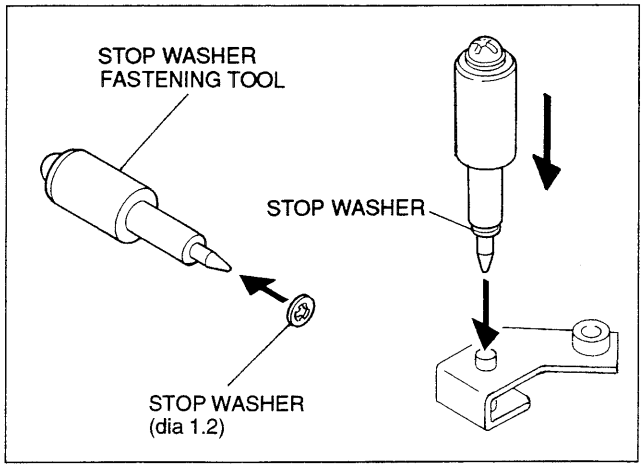
Never re-use the pre-used stop washers. When attaching the part, be sure to use the new stop washer.
Stop washer: 3-559-408-11 (dia 1.2)

• Stop washer removal
(a) Remove the stop washer using a pair of small nippers or tweezers.

Notes
- Take care not to fall in the unit.
- Take care not to touch the tool against the other parts (especially the drum).

• Stop washer (dia 1.2) installation
When attaching, it recommends to use the following tool.
Stop washer fastening tool: J-6323-530-A

(a) Put the stop washer to the top of the stop washer fastening tool.
(b) Put the top of the tool on the top of the shaft in an upright position.
(c) Press down the tool and attach the stop washer to the shaft.

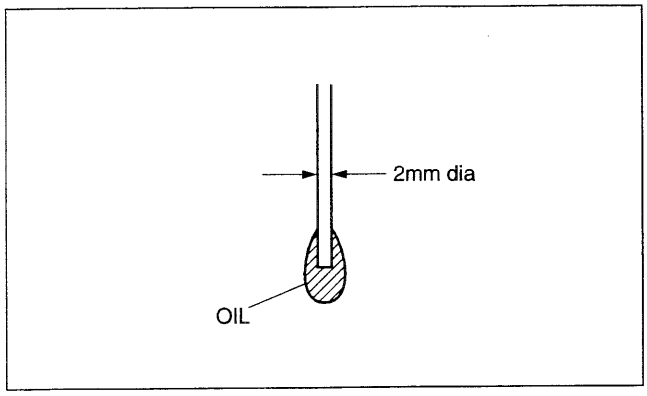


(3) About oil and grease

Be sure to use the relevant oil and grease.
If the different oil or grease used, major malfunction may cause due to the differences in viscosity and ingredients.
If the oil and grease used which mixed with dust, major malfunction may cause.
Be sure to use the following oil and grease.

Oil : 7-661-018-18
Grease (SGL-701) : 7-662-010-08

- A drop of oil defines as follows; About the amount will adhere to the end of a stick (2 mm in diameter) as shown in the figure.
- Smear grease onto the surface of the part like a thin film.
  If grease smeared apart from the relevant areas, be sure to wipe using a gauze or soft cloth.
- Apart from the relevant areas never use the oil and grease.



7-2-1. Upper Drum Assembly Replacement

Overviews

Replacement
Brush cover removal
Brush assembly removal
Desoldering the leads of slip ring assembly
Upper drum assembly removal
Cleaning of contact surfaces
Upper drum assembly installation
Upper drum eccentricity adjustment tool installation
Upper drum eccentricity adjustment
Upper drum eccentricity adjustment tool removal
Soldering the leads of slip ring assembly
Brush assembly installation
Brush cover installation
Cleaning of video heads and tape running surfaces
Adjustments after replacement
Tape running adjustment
Video tracking adjustment
CTL head height adjustment
CTL head position adjustment
CUE head height adjustment
CUE/TC head position adjustment
Automatic servo adjustment
Video system adjustment (Equalizer)

Notes

If rotary heads worn out or broke, replace the upper drum assembly.
The head chip can not replace.

Basic information

Apart from the periodic replacement time, the upper drum assembly needs to replace in the following case.
• If the correct RF waveform did not obtain after the tracking adjustment.

Preparations

1. Check that the unit is in the unthreading end mode.
2. Turn the power off.
3. Remove the front lid and the outside panel.(Refer to section 1-5.)

Reference: The upper drum assembly can replace when the cassette compartment attaches to the unit.

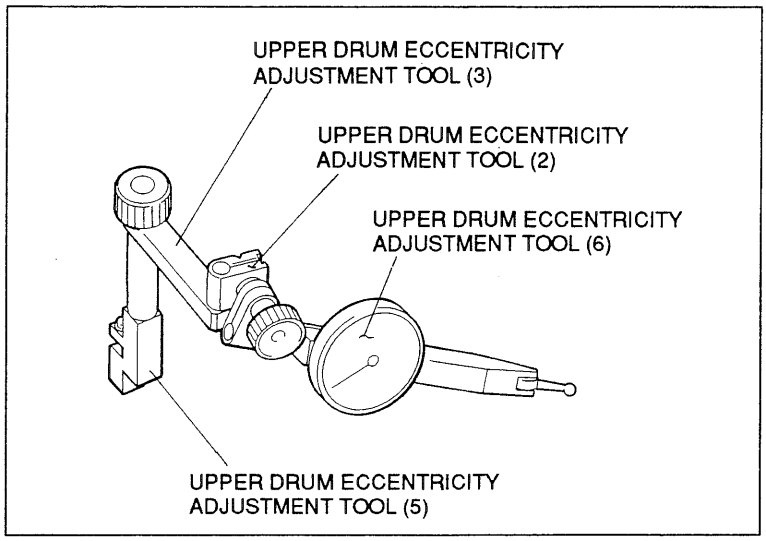
Tools

- Torque screwdriver bit (for M2) : J-6325-380-A
- Hexagon bit (across 1.5 mm) : J-6326-120-A
- Torque screwdriver (for 3 kg) : J-6325-400-A
- Upper drum eccentricity adjustment tool (3) : J-6001-820-A
- Upper drum eccentricity adjustment tool (2) : J-6001-830-A
- Upper drum eccentricity adjustment tool (5) : J-6087-000-A
- Upper drum eccentricity adjustment tool (6) : J-6325-530-A
- L wrench (across 1.5 mm) : 7-700-736-05
- Cleaning cloth : 3-184-527-01
- Cleaning fluid : 9-919-573-01

References: (1) If the upper drum assembly attaches to the flange, tighten the screws to the following torque reading.
- First: 9.8×10^{-2} N•m (1 kfg•cm)
- Second: 24.5×10^{-2} N•m (2.5 kgf•cm)

To tighten the screws to the above torque reading, set the torque to 9.8×10^{-2}N•m (1kgf•cm) after attaching the hexagon bit to the torque screwdriver.

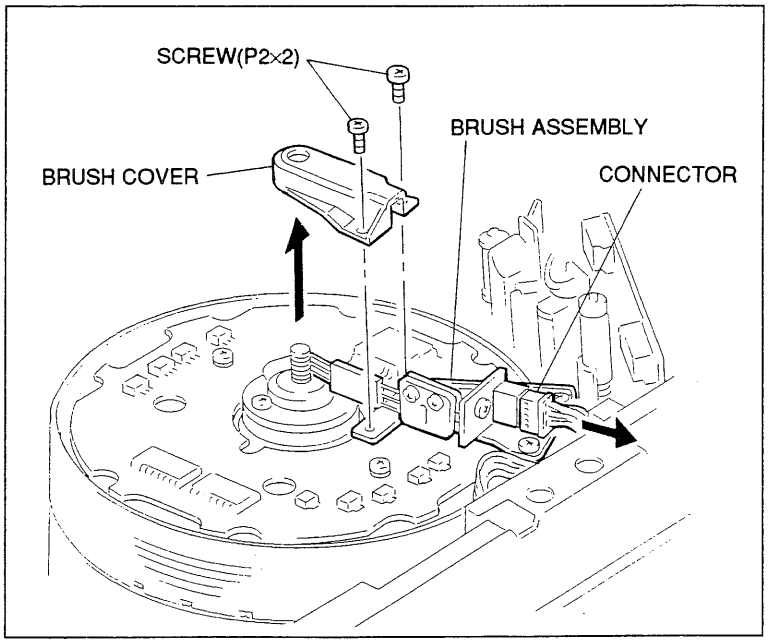
References: (2) Assemble the upper drum eccentricity adjustment tool before it can use.


UPPER DRUM ECCENTRICITY ADJUSTMENT TOOL (3)
UPPER DRUM ECCENTRICITY ADJUSTMENT TOOL (2)
UPPER DRUM ECCENTRICITY ADJUSTMENT TOOL (6)
UPPER DRUM ECCENTRICITY ADJUSTMENT TOOL (5)

Removal

1. Brush cover removal

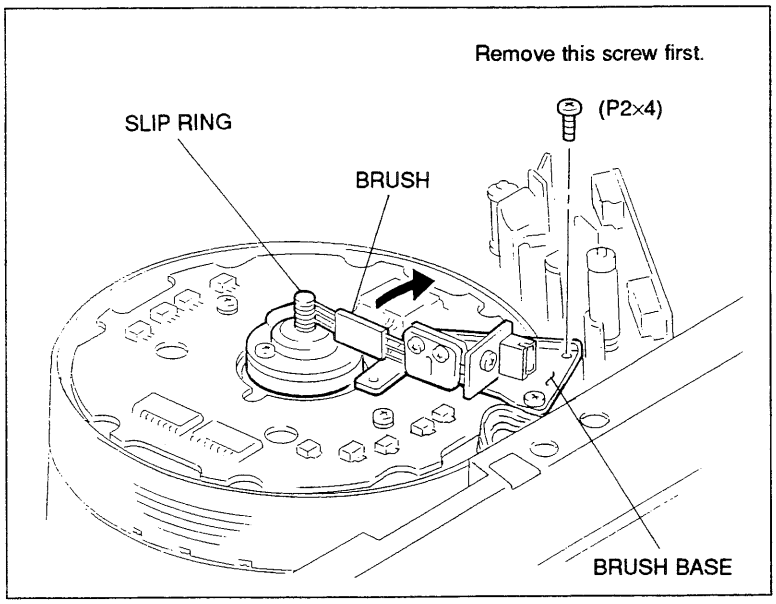
(1) Disconnect the connector on the brush assembly board.
(2) Remove the two screws and the brush cover.



2. Brush assembly removal

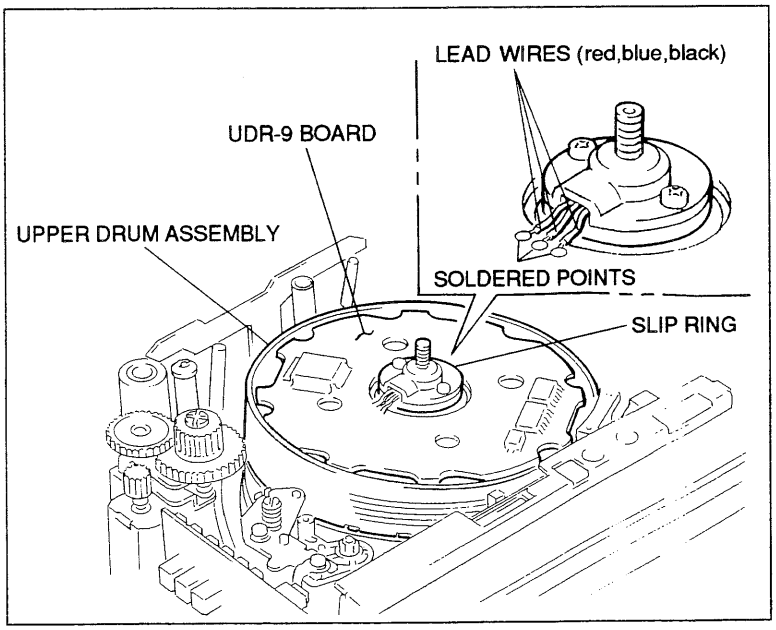
(1) Remove one of the screws which secures the brush base.
(2) Loosen the other screw and move the brush base in the direction of the arrow. In this way the brush and slip ring will release.
(3) Remove the screw and the brush assembly.

Note
Never touch the brush.



3. Desoldering the leads of slip ring assembly

Desolder the three leads of the slip ring assembly from the UDR-9 board on the upper drum assembly.



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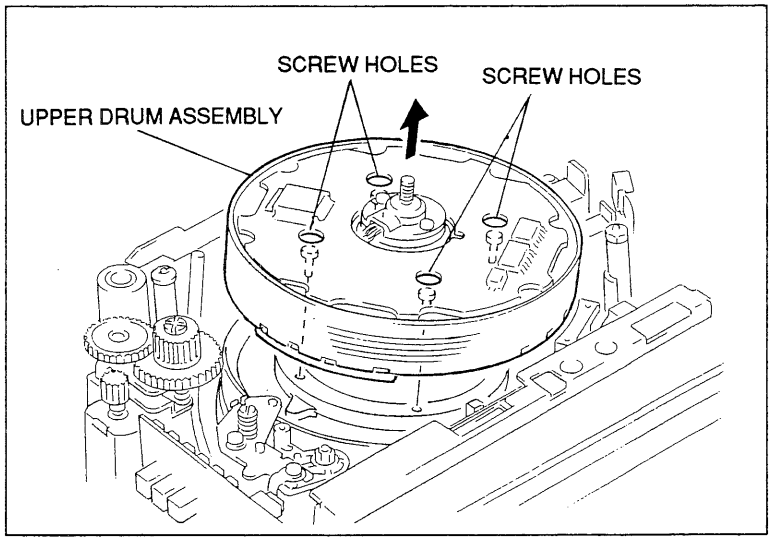
4. Upper drum assembly removal

(1) Put an L wrench in the holes of the upper drum assembly and remove the four screws.

(2) Lift just above and remove the upper drum assembly.

Notes

- After removing, take care not to damage the upper edge of the lower drum.
- Remove the screws from the removed upper drum assembly using a pair of tweezers.



Installation

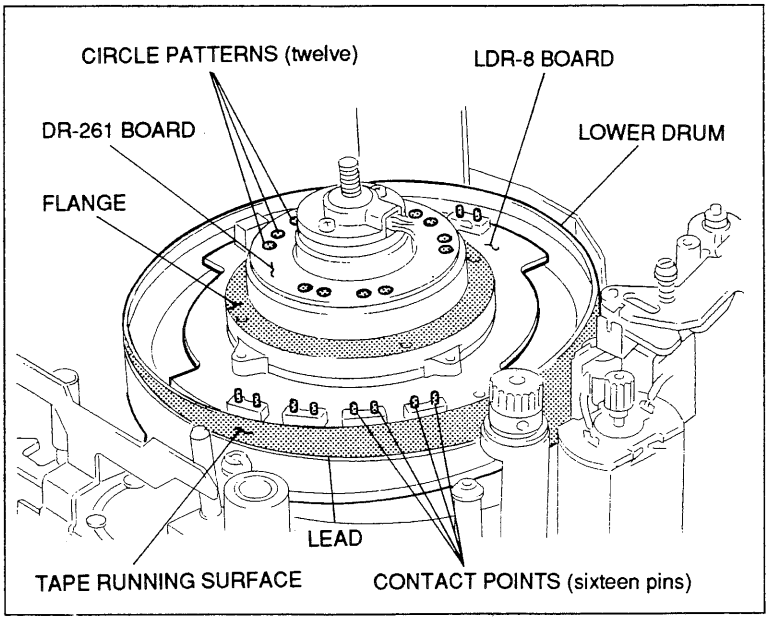
5. Cleaning of contact surfaces

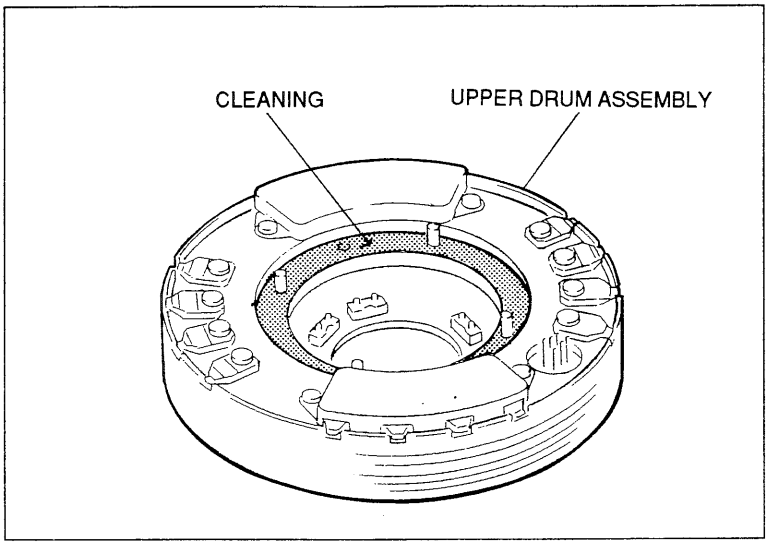
(1) Clean the following places using a cleaning cloth moistened with cleaning fluid.
- Flange of the lower drum (Shaded portion)
- Tape running surface and lead of the lower drum
- Contact surface of the new upper drum assembly (Shaded portion)

(2) Wipe the eight contact points (sixteen pins) that mounts onto the LDR-8 board of the flange and twelve circle patterns on the DR-261 board using a dry cleaning cloth.

Note

Never clean using a cleaning cloth moistened with cleaning fluid.





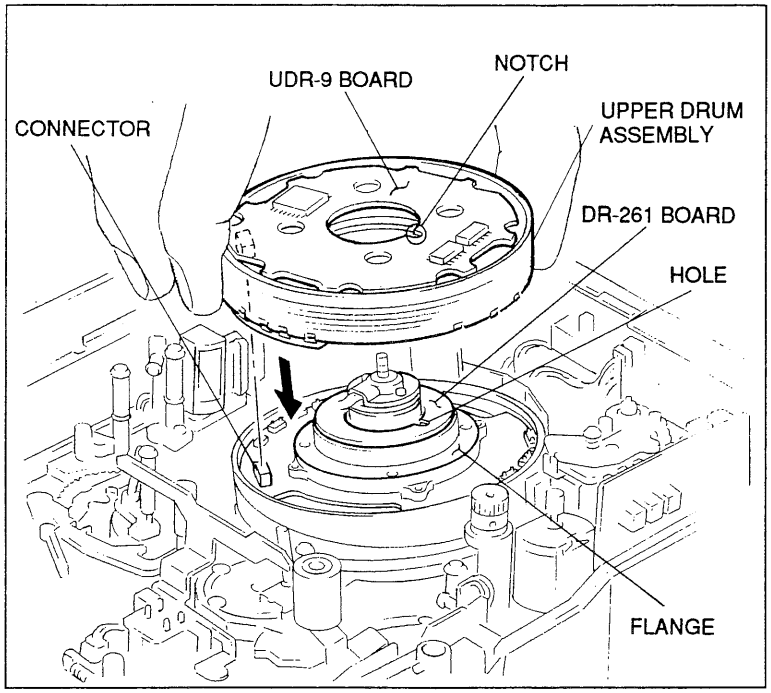
6. Upper drum assembly installation

(1) Hold the no video head portions of the new upper drum assembly by hand. Align the notch of the center hole on the UDR-9 board with the hole of the DR-261 board.
(2) Move the upper drum assembly in the direction of the flange (Do not tilt.) and connect a 6-pin connector plug to a connector on the LDR-8 board of flange.

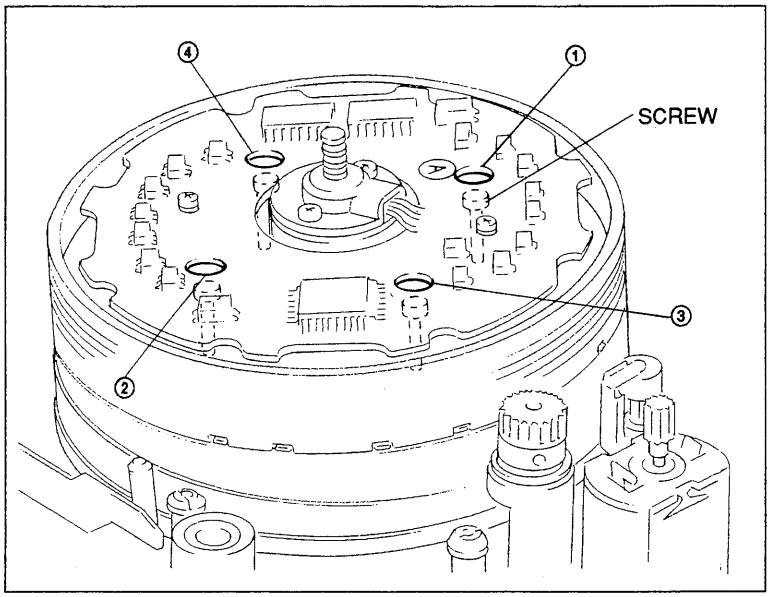
Note

When attaching, take care not to touch the video heads against the brush support or the peripheral parts.

(3) Press the upper drum assembly in the direction of the flange until it securely attached.



(4) Put the four screws which removed in step 4 in the four holes on the board of the upper drum assembly using a pair of tweezers.
(5) Using the L wrench thread the four screws in the sequence shown in the figure. Do not tighten them.

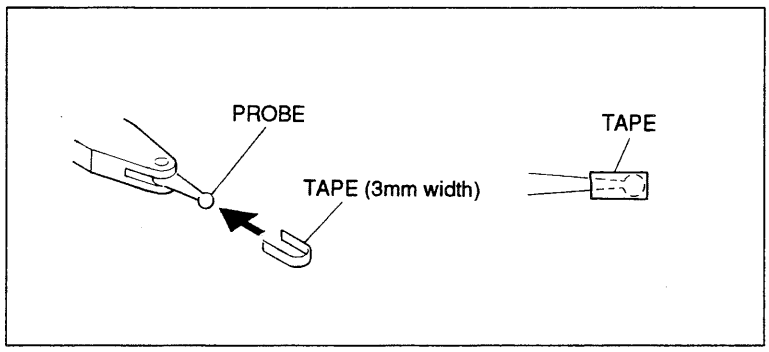


7. Upper drum eccentricity adjustment tool installation

(1) Clean the probe of the tool using a cleaning cloth moistened with cleaning fluid.

Notes

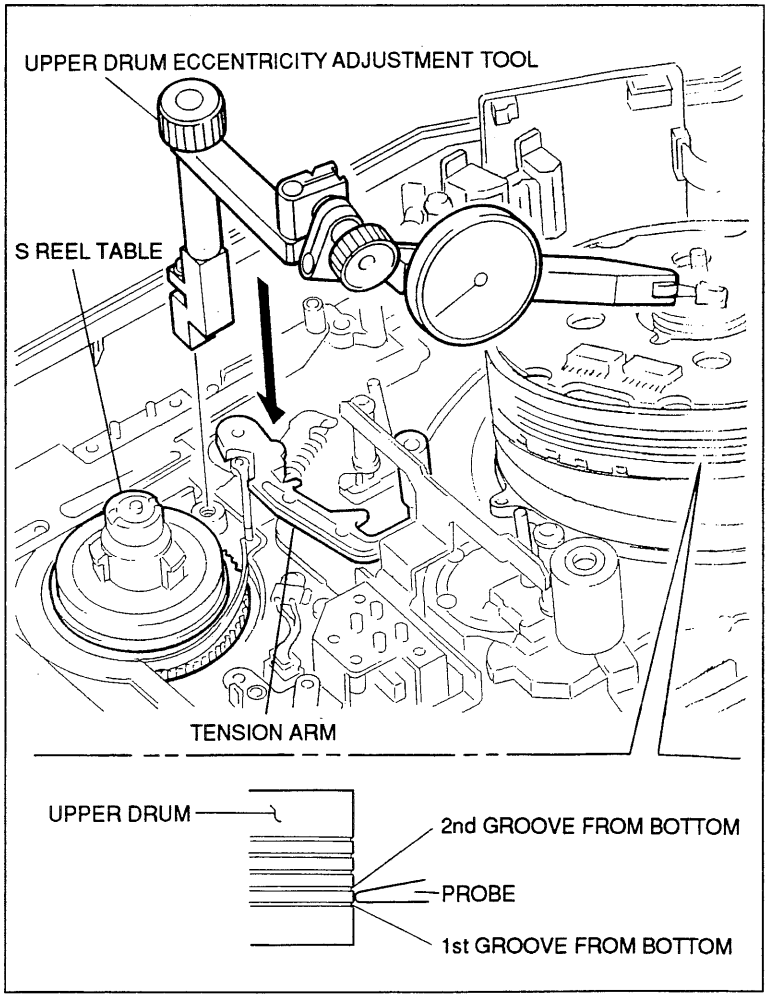
- If the probe were dirty, the upper drum assembly may scratch.
- If the probe were made of metal, it recommends that lubricated protective tape puts on the probe to prevent the scratching.



(2) Attach the tool as shown in the figure and adjust so that the probe is positioned between the bottom two grooves of the five which locate on the outside of the upper drum assembly.

Note

Take care not to touch the probes against the video heads



8. Upper drum eccentricity adjustment

(1) Slowly turn the upper drum assembly counterclockwise and for one turn check that the indicated deflection of a gauge meets the following specification.

Specification: Within 3 μm

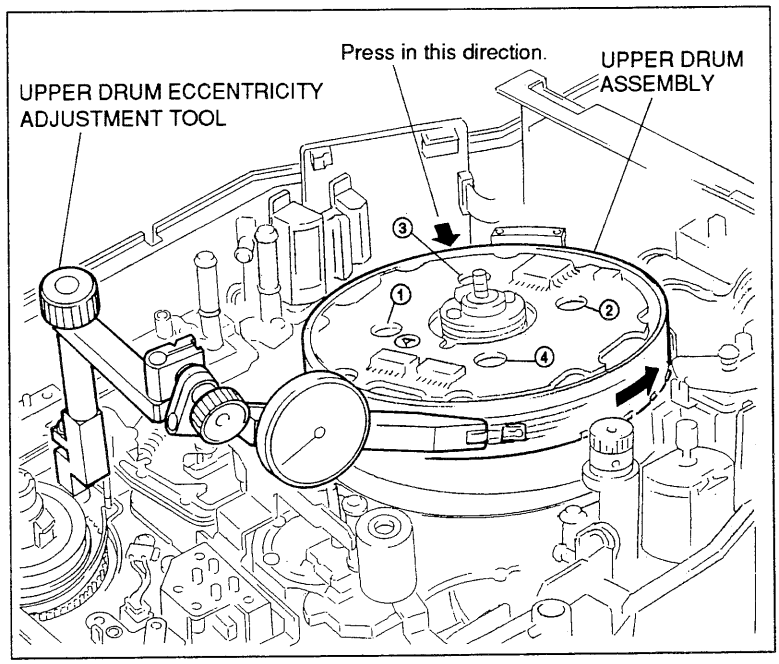
If the specification did not meet, repeat the following three steps and adjust until the specification met.

(a) Slowly turn the upper drum assembly counterclockwise and check the maximum and minimum value of the indicated deflections.

(b) Turn the upper drum assembly until the minimum deflection value indicates.

(c) From the end opposite the prove press the upper drum assembly in the direction of the arrow so that the indicated deflection is half way between maximum and minimum value.

References: If the indicated deflection did not move when pressing the upper drum assembly by finger, loosen the four screws that secure the upper drum assembly.If the indicated deflection easily moved when pressing, tighten the screws a little.



(2) Set the torque screwdriver to 9.8×10^{-2} N•m (1 kgf•cm). Put the torque screwdriver in the four holes on the board of the upper drum assembly. Tighten the four screws in the sequence shown in the figure.

Note

When tightening the screws just after the eccentricity adjustment, be sure to tighten them to 9.8×10^{-2} N•m (1 kgf•cm).

(3) Set the torque screwdriver to 24.5×10^{-2} N•m (2.5 kgf•cm).

(4) Tighten the four screws in the same sequence as in step (2).

(5) Re-check that the specification met.

9. Upper drum eccentricity adjustment tool removal

Remove the upper drum eccentricity adjustment tool.

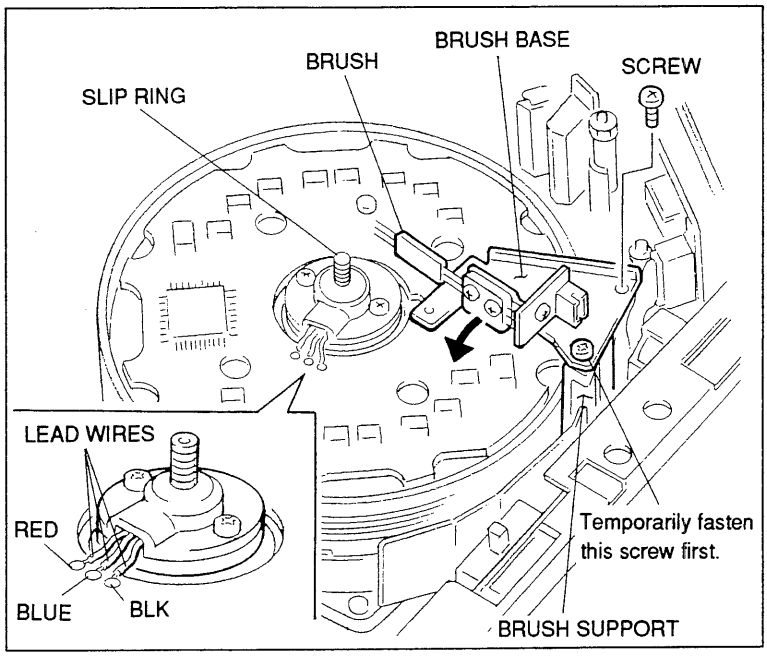
10. Soldering the leads of slip ring assembly

Solder the three leads of the slip ring assembly to the UDR-9 board on the upper drum assembly.

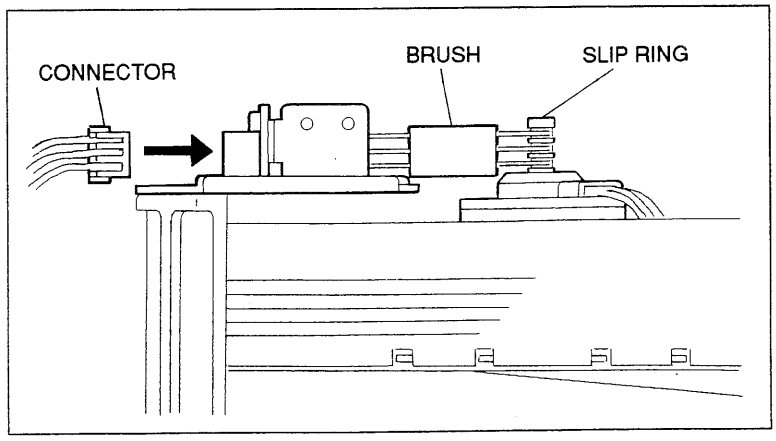
Red lead : RED pattern
Blue lead : BLUE pattern
Black lead : BLK pattern

11. Brush assembly installation

(1) Temporarily attach the brush assembly to the brush support using the screw as shown in the figure.
(2) Move the brush base while pressing down the brush base above the brush support and temporarily attach the brush assembly using the other screw.
(3) Tighten the screws in steps (1) and (2).
19×10^{-2} N•m (1.9 kgf•cm)



(4) Check that the brush touches against the slip ring.
Reference: Once steps (1) to (3) completed, the height of the brush and contact pressure against the slip ring will automatically adjust.
(5) Connect the connector on the brush assembly board.



12. Brush cover installation

Align the hole of the brush cover with the shaft of the slip ring and tighten the two screws.
19×10^{-2} N•m (1.9 kgf•cm)

13. Cleaning of video heads and tape running surfaces

Clean the following areas using a cleaning cloth moistened with cleaning fluid.

- Video heads (Refer to section 6-1-2.)
- Tape running surface of the upper drum (Refer to section 6-1-2.)
- Tape running surface and lead of the lower drum (Refer to section 6-1-3.)

Note

After cleaning, be sure to wipe the relevant areas using a dry cleaning cloth.

Adjustments after replacement

14. Tape running adjustment
(Refer to section 7-4-1.)

15. Video tracking adjustment
(Refer to section 7-4-2.)

16. CTL head height adjustment
(Refer to section 7-4-3.)

17. CTL head position adjustment
(Refer to section 7-4-4.)

18. CTL head position adjustment
(Refer to section 7-4-5.)

19. CUE/TC head position adjustment
(Refer to section 7-4-8.)

20. Servo system adjustment
(Refer to section 5-3-1.)

21. Video system adjustment (Equalizer)
(Refer to section 5-3-3.)

7-2-2. Brush Assembly Replacement for Slip Ring

Overviews

Replacement
Brush cover removal
Brush assembly removal
Brush assembly installation
Brush cover installation

Notes

If the brush worn out, replace the brush assembly.
Once the brush assembly attached referring to the following procedures, the relative height and contact pressure against the slip ring will automatically adjust.
Never clean on the surface of the brush using a cleaning cloth moistened with cleaning fluid.

If slip ring is soiled, clean the slip ring as following procedure:
(1) Press the white cotton thread against the groove of the slip ring.
(2) Rotate the upper drum slowly in the counterclockwise direction.

Preparations

1. Turn the power off.
2. Remove the front lid and the outside panel. (Refer to section 1-5.)

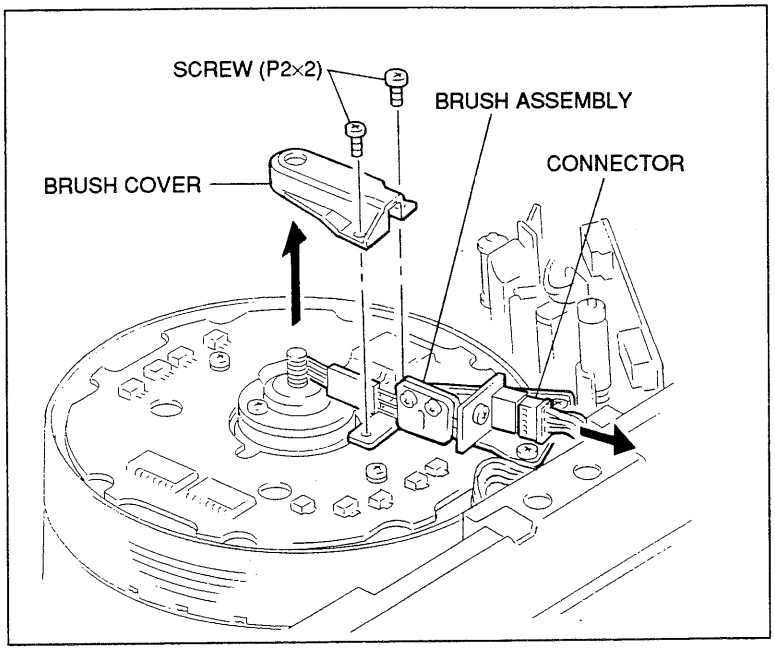
Reference: The brush assembly can replace when the cassette compartment attaches to the unit.

Tools

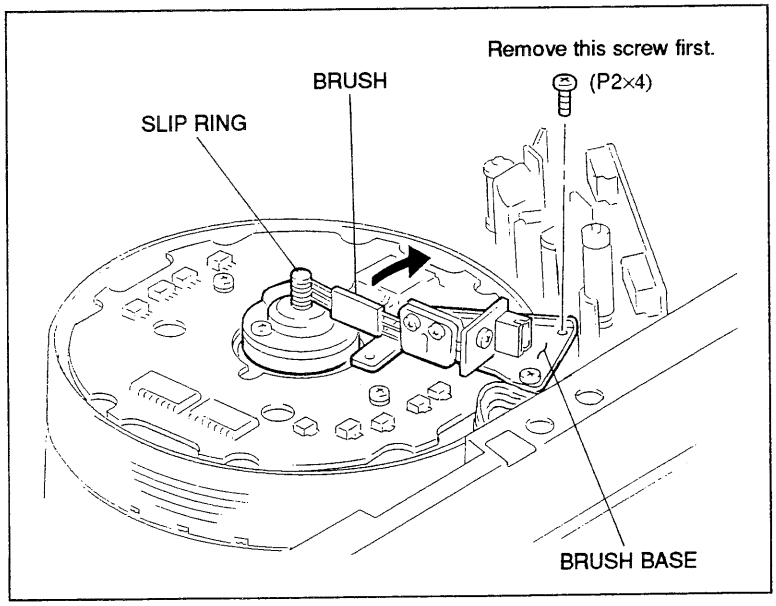
- Torque screwdriver bit (for M2) : J-6325-380-A
- Torque screwdriver (for 3 kg) : J-6325-400-A

Removal

1. **Brush cover removal**
   (1) Disconnect the connector on the brush assembly board.
   (2) Remove the two screws and the brush cover.



2. **Brush assembly removal**
   (1) Remove one of the screws which secures the brush base.
   (2) Loosen the other screw and move the brush base in the direction of the arrow. In this way the brush and slip ring will release.
   (3) Remove the screw and the brush assembly.



Installation

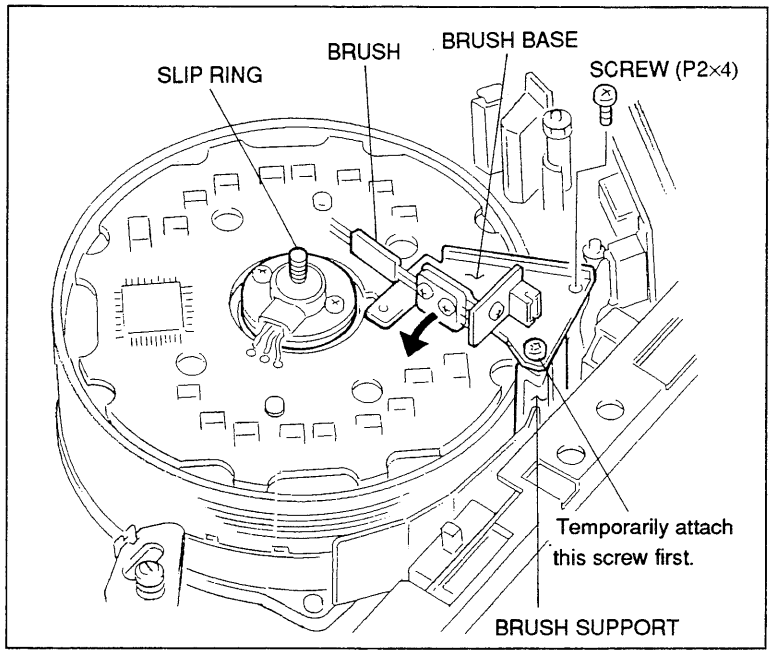
3. Brush assembly installation

(1) Temporarily attach the brush assembly to the brush support using the screw shown in the figure.

Note
Never touch the brush.

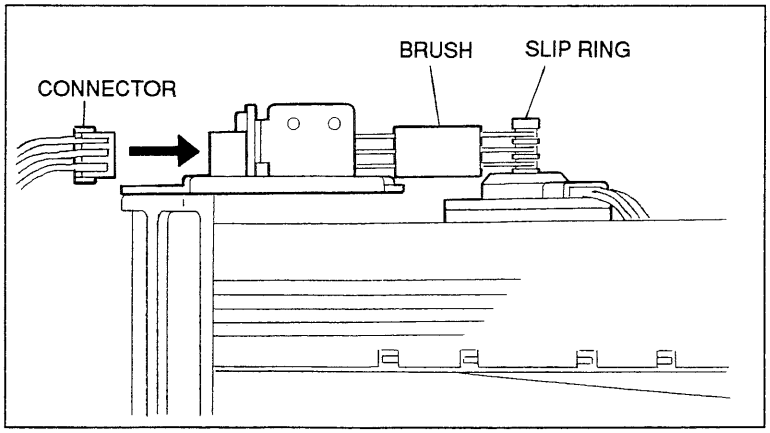
(2) Move the brush base while pressing down the brush base above the brush support and temporarily attach the brush assembly using the other screw.

(3) Tighten the screws in steps (1) and (2).
19×10^{-2} N•m (1.9 kgf•cm)



(4) Check that the brush touches against the slip ring.
Reference: Once steps (1) to (3) completed, the height of the brush and contact pressure against the slip ring will automatically adjust.

(5) Connect the connector on the brush assembly board.



4. Brush cover installation

Align the hole of the brush cover with the shaft of the slip ring and tighten the two screws.
19×10^{-2} N•m (1.9 kgf•cm)

7-2-3. Slip Ring Assembly Replacement

Overviews

Replacement
Brush cover removal
Brush assembly removal
Slip ring assembly removal
Slip ring assembly installation
Brush assembly installation
Brush cover installation

Notes

If the slip ring worn out, replace the slip ring assembly.
Once the slip ring assembly replaced, the adjustment do not need.
Never clean on the surface of the slip ring assembly using a cleaning cloth moistened with cleaning fluid.

Preparations

1. Turn the power off.
2. Remove the front lid and the outside panel. (Refer to section 1-5.)

Reference: The slip ring assembly can replace when the cassette compartment attaches to the unit.

Tools

- Torque screwdriver bit (for M2) : J-6325-380-A
- Torque screwdriver (for 3 kg) : J-6325-400-A

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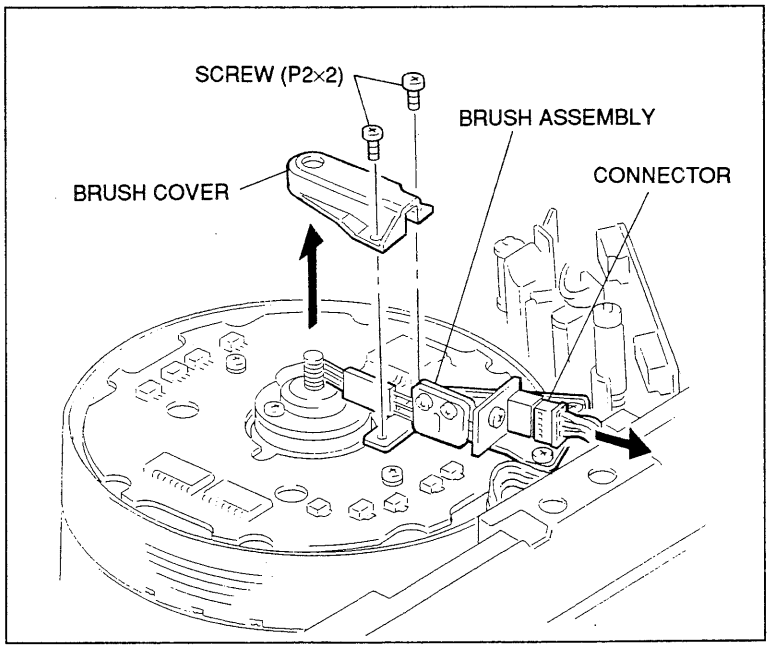
Removal

1. Brush cover removal

(1) Disconnect the connector on the brush assembly board

(2) Remove the two screws and the brush cover.



2. Brush assembly removal

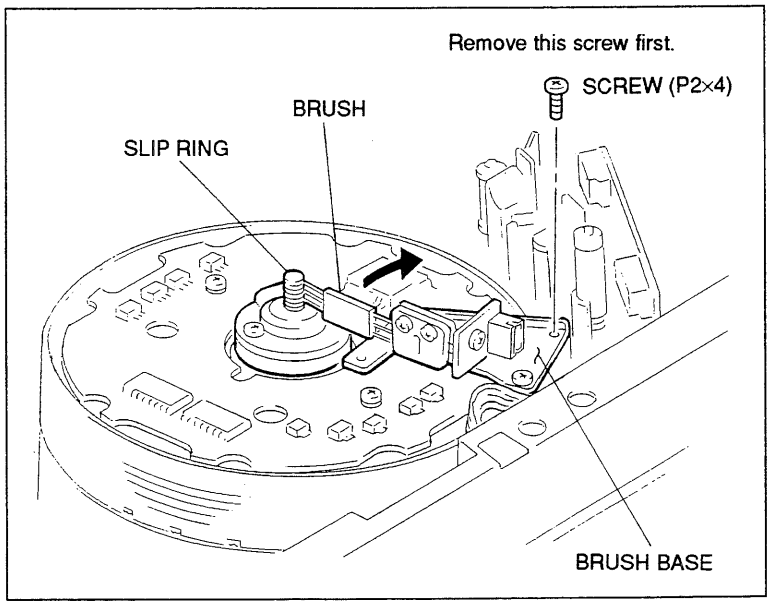
(1) Remove one of the screws which secures the brush base.

(2) Loosen the other screw and move the brush base in the direction of the arrow. In this way the brush and slip ring will release.

(3) Remove the screw and the brush assembly.

Note

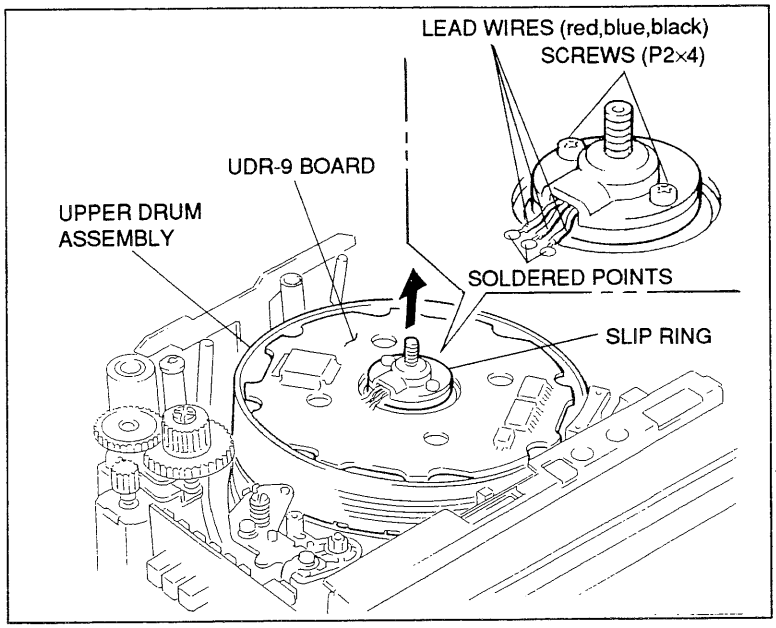
Never touch the brush.



3. Slip ring assembly removal

(1) Desolder the three leads of the slip ring assembly from the UDR-9 board on the upper drum assembly.

(2) Remove the two screws and the slip ring assembly.



Installation

4. Slip ring assembly installation

(1) Attach the slip ring assembly to the drum shaft so that the three leads of the slip ring assembly are positioned to the printed silk (RED, BLUE and BLK) on the UDR-9 board of the upper drum assembly.

Notes

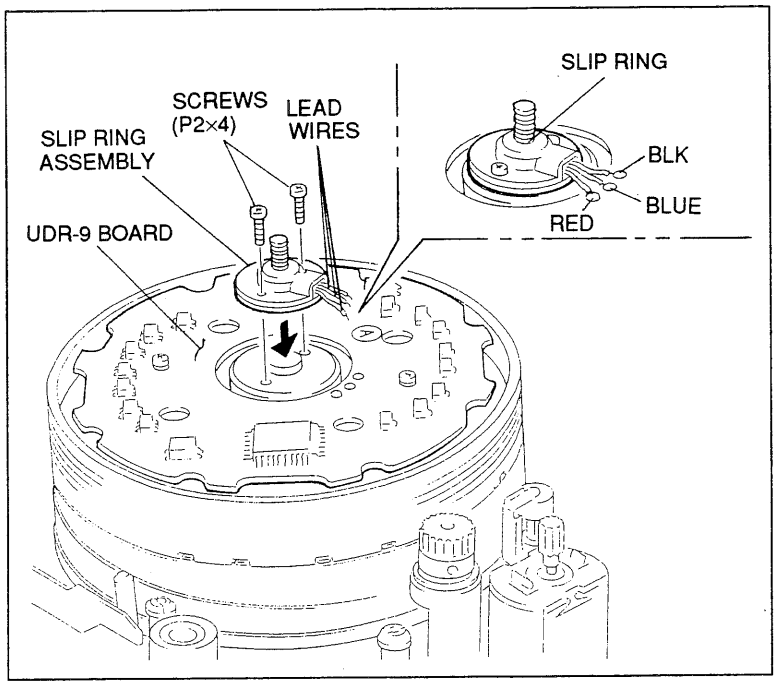
Hold the black portion of the slip ring assembly. Never touch the slip ring.

(2) Attach the slip ring assembly using the two screws.

19×10^{-2} N•m (1.9 kgf•cm)

(3) Solder the three leads of the slip ring assembly to the UDR-9 board on the upper drum.

Red lead : RED pattern
Blue lead : BLUE pattern
Black lead : BLK pattern

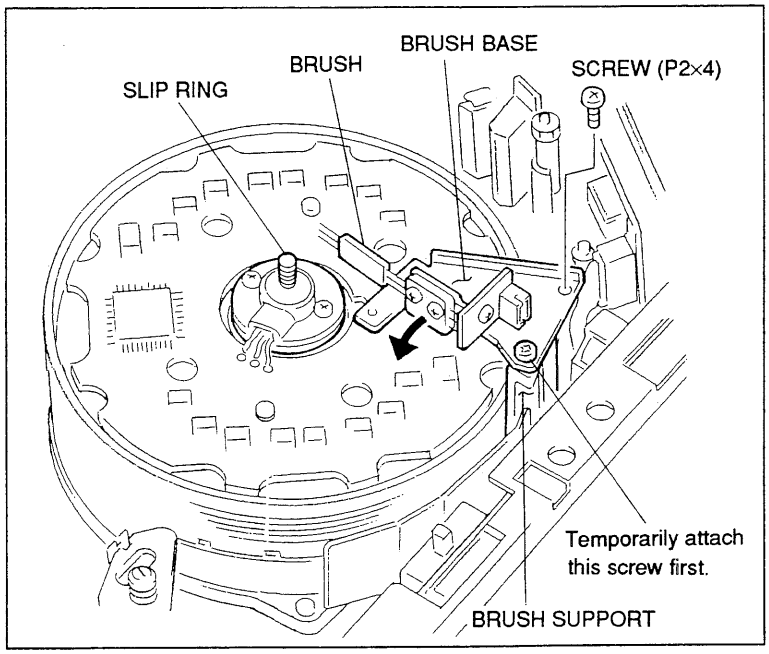


5. Brush assembly installation

(1) Temporarily attach the brush assembly to the brush support using the screw shown in the figure.

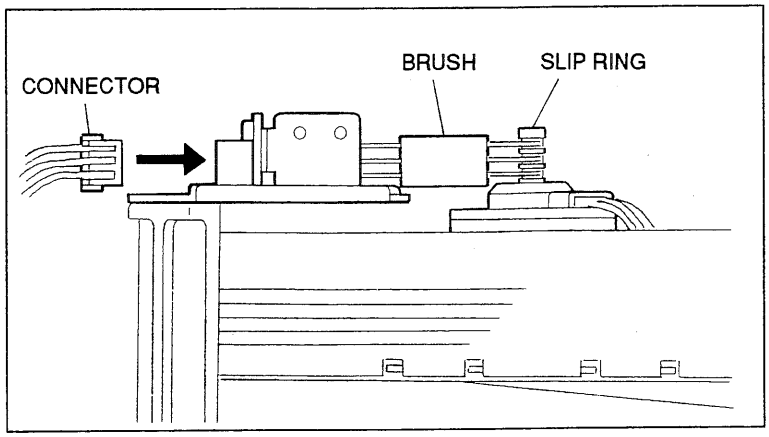
(2) Move the brush base in the direction of the arrow while pressing down the brush base above the brush support and temporarily attach the brush assembly using the other screw.

(3) Tighten the screws in steps (1) and (2).
19×10^{-2} N•m (1.9 kgf•cm)



(4) Check that the brush touches against the slip ring.
Reference: Once steps (1) to (3) completed, the height of the brush and contact pressure against the slip ring will automatically adjust.

(5) Connect the connector on the brush assembly board.



6. Brush cover installation

Align the hole of the brush cover with the shaft of the slip ring and tighten the two screws.

7-2-4. Drum Assembly Replacement

Overviews

Replacement
Video head cleaner removal
Disconnection of the brush assembly connector
Drum assembly removal
Cleaning of contact surfaces
Drum assembly installation
Connection of the brush assembly connector
Video head cleaner installation
Cleaning of video heads and tape running surface
Adjustments after replacement
Tape running adjustment
Video tracking adjustment
CTL head height adjustment
CTL head position adjustment
CUE head height adjustment
CUE/TC head position adjustment
Automatic servo adjustment
Video system adjustment (Equalizer)

Notes

When replacing the drum assembly, take care not to damage the CTL head, CUE/TC head and the peripheral tape guides.
Take care not to break the video heads of the drum assembly.

Basic information

Apart from the periodic replacement time, the drum assembly needs to replace in the following cases.
- If the drum assembly could not use because the tape running surface of the upper or lower drum scratched.
- If a correct RF waveform did not obtain after the tracking adjustment due to wear-out on the upper or lower drum.
- If the specification of the VTR such as jitter or noise did not meet due to the short life of the bearing.

Preparations

1. Check that the unit is in the unthreading end mode.
2. Turn the power off.
3. Remove the front lid and the outside panel (Refer to section 1-5.)

Reference: The drum assembly can replace when the cassette compartment attaches to the unit.

Tools

- Torque screwdriver bit (for M2) : J-6325-380-A
- Torque screwdriver (for 3 kg) : J-6325-400-A
- Cleaning cloth : 3-184-527-01
- Cleaning fluid : 9-919-573-01

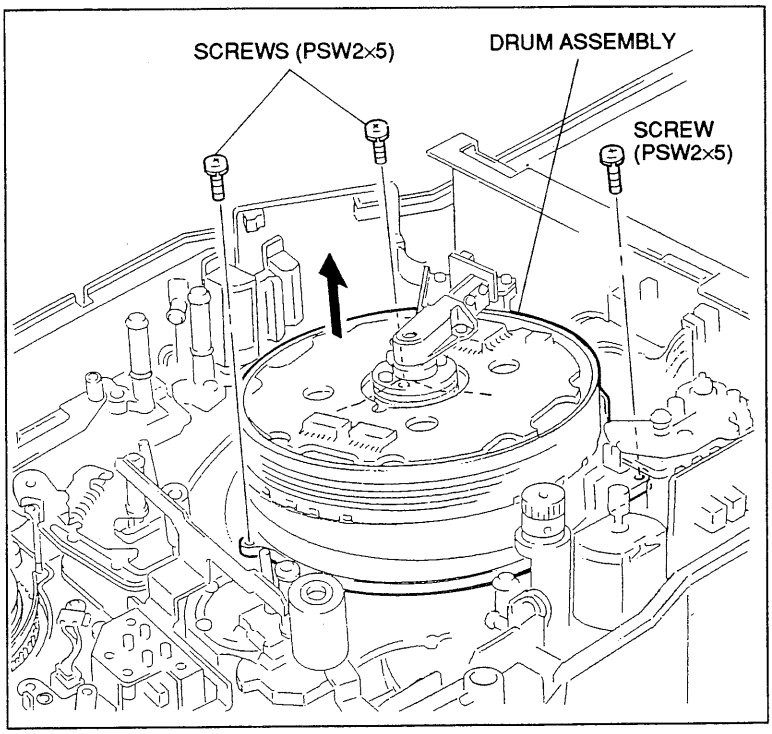
Removal

1. **Video head cleaner removal**
   (1) Check that the unit is in the unthreading end mode.
   (2) Turn the manual eject gear clockwise. Release the HC roller of the video head cleaner from the drum.
   (3) Loosen the screw while holding the VH cleaner using a pair of tweezers and remove it from the unit. (Refer to section 7-2-6.)
   Reference: The screw can not remove due to the stopper.

2. **Disconnection of the brush assembly connector**
   Disconnect the connector on the brush assembly board.

3. Drum assembly removal

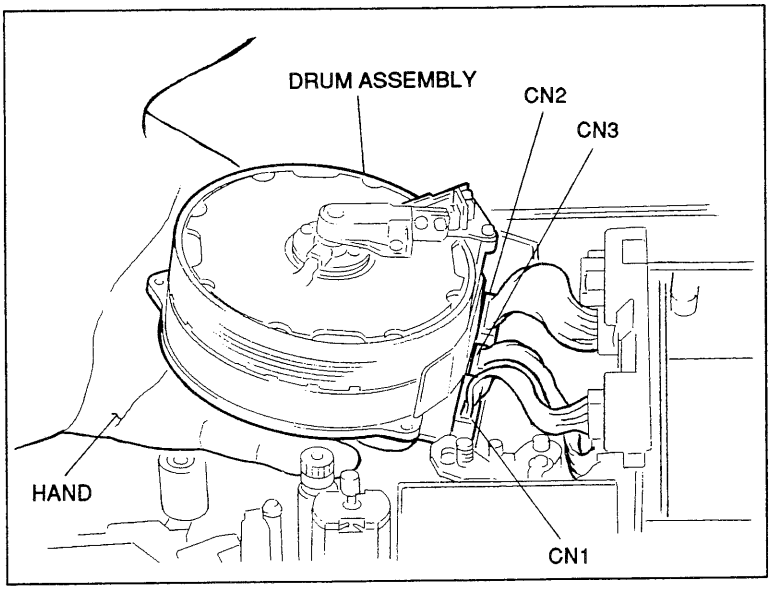
(1) Remove the three screws which secure the drum assembly.



(2) Lift just above the drum assembly and disconnect the three connectors (CN1, CN2 and CN3) on the lower board of the drum. In this way the drum assembly will remove.

Note

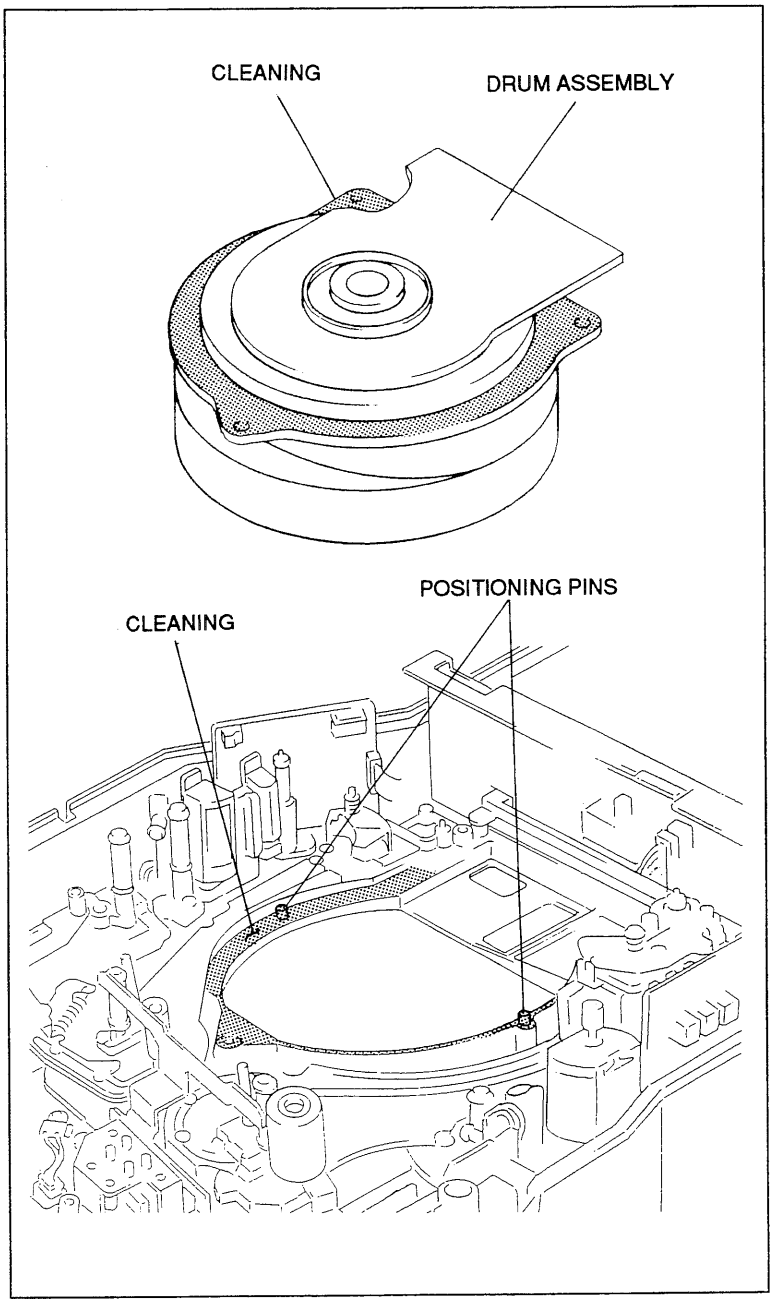
When removing, take care not to damage the CTL head, CUE/TC head and the peripheral tape guides.



Installation

4. Cleaning of contact surfaces

Clean the contact surfaces of the new drum assembly and chassis using a cleaning cloth moistened with cleaning fluid.



5. Drum assembly installation

(1) Hold the new drum assembly and connect the three connectors (CN1, CN2 and CN3) which disconnected in step 3.

Notes

- Be sure to hold the no video head portions.
- Take care not to touch the drum assembly against the CTL head, CUE/TC head and the peripheral tape guides.

(2) Put the two positioning pins of the chassis to the holes of the drum assembly.

(3) Move the drum assembly a little and check that the drum assembly puts in the positioning pins.

(4) Tighten the three screws.

19×10^{-2} N•m (1.9 kgf•cm)

6. Connection of the brush assembly connector

Connect the connector to the brush assembly board.

7. Video head cleaner installation

Put the video head cleaner onto the surface of the unit using a pair of tweezers and tighten the screw.

9×10^{-2} N•m (0.9 kgf•cm)

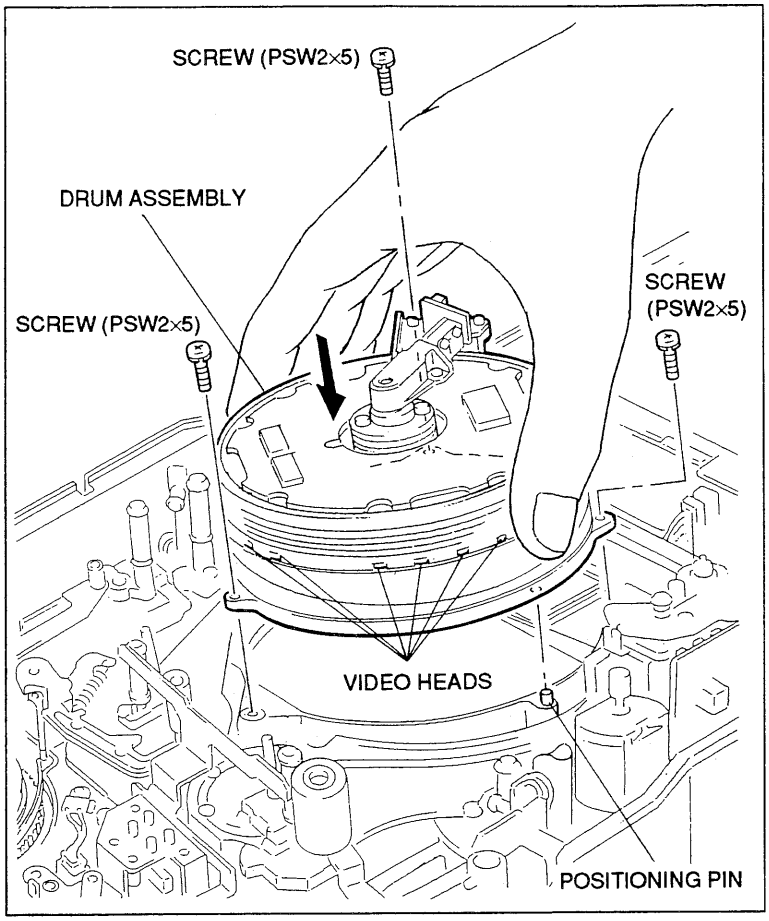
8. Cleaning of video heads and tape running surface

Clean the following areas using a cleaning cloth moistened with cleaning fluid.

- Video heads (Refer to section 6-1-2.)
- Tape running surface of the upper drum (Refer to section 6-1-2.)
- Tape running surface and lead of the lower drum(Refer to section 6-1-3.)

Note

After cleaning, be sure to wipe the relevant areas using a dry cleaning cloth.



Adjustments after replacement

9. **Tape running adjustment**
   (Refer to section 7-4-1.)

10. **Video tracking adjustment**
    (Refer to section 7-4-2.)

11. **CTL head height adjustment**
    (Refer to section 7-4-3.)

12. **CTL head position adjustment**
    (Refer to section 7-4-4.)

13. **CUE head height adjustment**
    (Refer to section 7-4-5.)

14. **CUE/TC head position adjustment**
    (Refer to section 7-4-8.)

15. **Servo system adjustment**
    (Refer to section 5-3-1.)

16. **Video system adjustment**
    (Refer to section 5-3-3.)

7-2-5. Pinch Roller Replacement

Overviews

Replacement
Pinch roller removal
Install shaft cleaning
Pinch roller installation
Pinch roller cleaning
Adjustments after replacement
Tape running adjustment
CUE head height adjustment

Note

If pinch roller worn-out, replace the pinch roller.

Preparations

1. Check that the unit is in the unthreading end mode.
2. Turn the power off.
3. Remove the front lid and the outside panel. (Refer to section 1-5.)

Reference: The pinch roller can replace when the cassette compartment attaches to the unit.

Tools

- Torque screwdriver bit (for M1.4) : J-6325-110-A
- Torque screwdriver (for 3 kg) : J-6325-400-A
- Cleaning cloth : 3-184-527-01
- Cleaning fluid : 9-919-573-01

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Removal

1. **Pinch roller removal**
   (1) Loosen the center screw of the pinch roller. Lift just above and remove the pinch roller.
   (2) Remove the screw from the pinch roller.

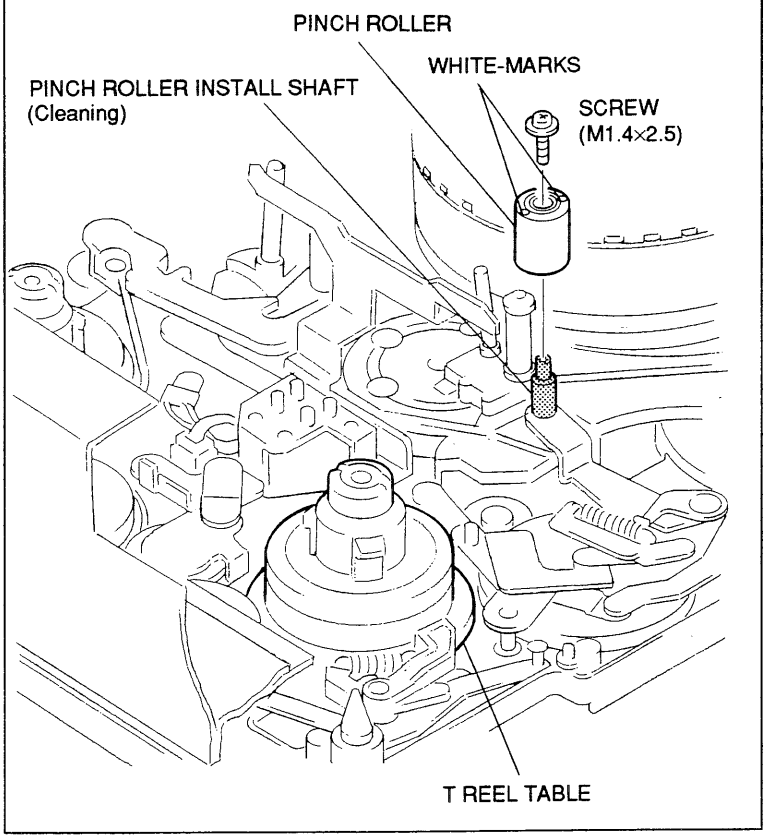
Installation

2. **Install shaft cleaning**
   Clean a pinch roller install shaft using a cleaning cloth moistened with cleaning fluid.

3. **Pinch roller installation**
   Attach the pinch roller to the pinch roller install shaft after the white-marked side is above. Tighten the screw removed in step 1.
   EK 9×10^{-2} N•m (0.9 kgf•cm)

4. **Pinch roller cleaning**
   Clean the surface of the pinch roller using a cleaning cloth moistened with cleaning fluid.

• **Omitted the main frame chassis in this illustration.**



Adjustments after replacement

5. **Tape running adjustment**
   (Refer to section 7-4-1.)

6. **CUE head height adjustment**
   (Refer to section 7-4-5.)

7-2-6. HC Roller Assembly Replacement for Video Heads

Overviews

Replacement
Mode selection
Video Head cleaner assembly removal
HC roller replacement
Video Head cleaner assembly installation
Operation check

Note

The adjustment after replacing do not need.

Preparations

1. Turn the power off.
2. Remove the front lid and the outside panel. (Refer to section 1-5.)

Note

- When replacing, prepare the new CR spacer (P/N 3-182-765-02).

Tools

- Torque screwdriver bit (for M1.4) : J-6325-110-A
- Torque screwdriver (for 3 kg) : J-6325-400-A

Removal

1. Mode selection

(1) Check that the unit is the unthreading end mode.

(2) Turn the manual eject gear clockwise. Release the HC roller from the drum.

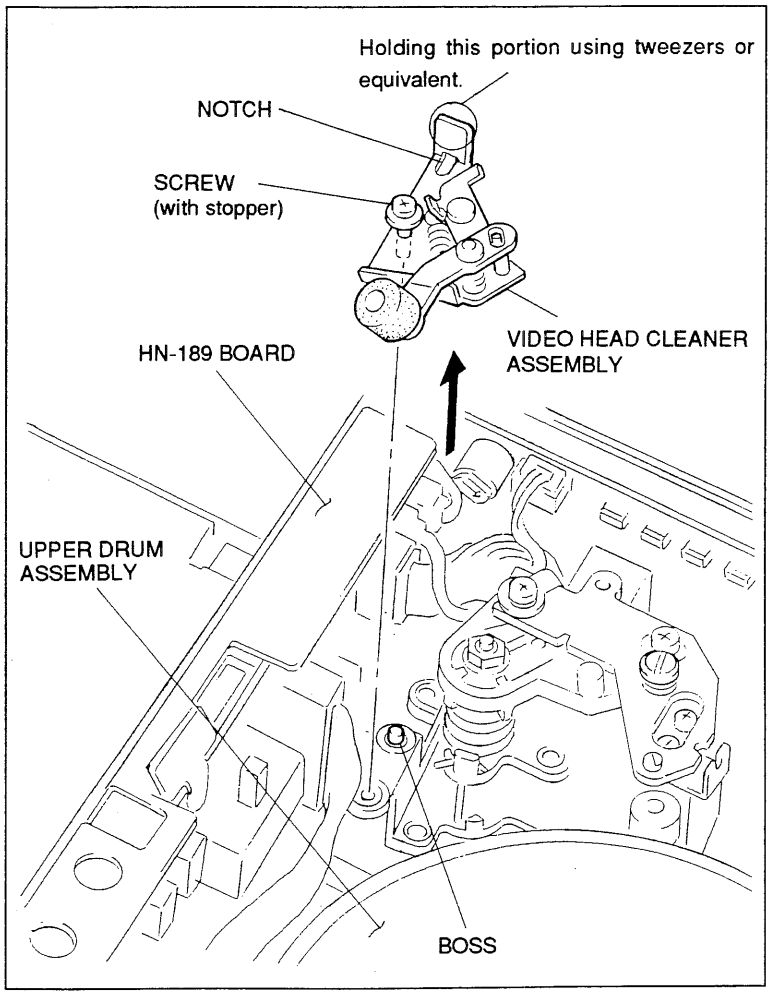
2. Video Head cleaner assembly removal

(1) Turn the upper drum assembly by finger so that the video heads are not situated near the video head cleaner assembly.

(2) Loosen the screw while holding the video head cleaner using a pair of tweezers as shown in the figure and remove the video head cleaner assembly.

Notes

- When removing, take care not to touch the tweezers, screwdriver and video head cleaner assembly against the upper drum or drum assembly.
- The screw can not remove due to the stopper.



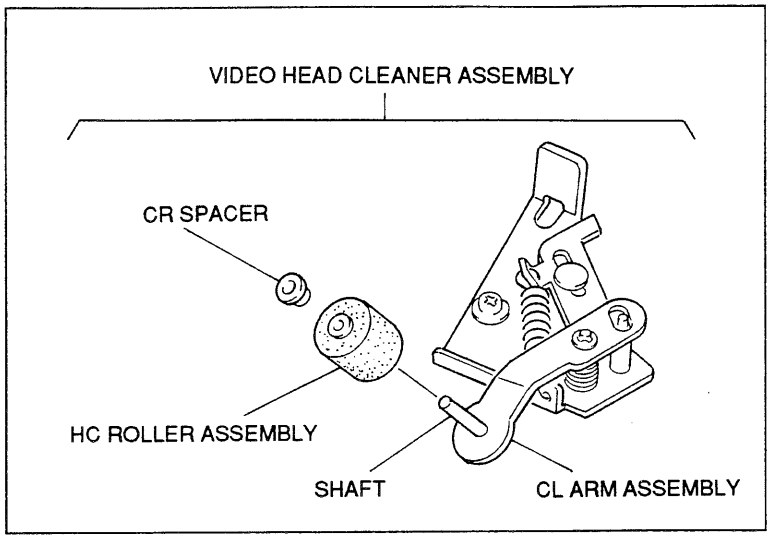
Installation

3. HC roller replacement

(1) Remove the CR spacer and the HC roller assembly.

(2) Put the new HC roller assembly in the shaft and attach using the new CR spacer.

Reference: The HC roller assembly can install in either side due to no right-side up.



4. Video Head cleaner assembly installation

Put the boss of the chassis in the notch of the video head cleaner assembly and tighten the screw.

5. Operation check

When turning the manual eject gear clockwise or counterclockwise, check that the HC roller assembly releases from the drum and touches against the drum.

7-2-7. CUE Brush Replacement for CUE Head

Overviews

Replacement
Mode selection
Manual eject assembly removal
CUE brush replacement
Manual eject assembly installation
Operation check

Note

The adjustment after replacing do not need.

Preparations

1. Turn the power off.
2. Remove the front lid and the outside panel. (Refer to section 1-5.)

Note

• When replacing, prepare the new stopper washer (P/N 3-321-393-11).

Removal

1. Mode selection
Check that the unit is in the unthreading end mode.

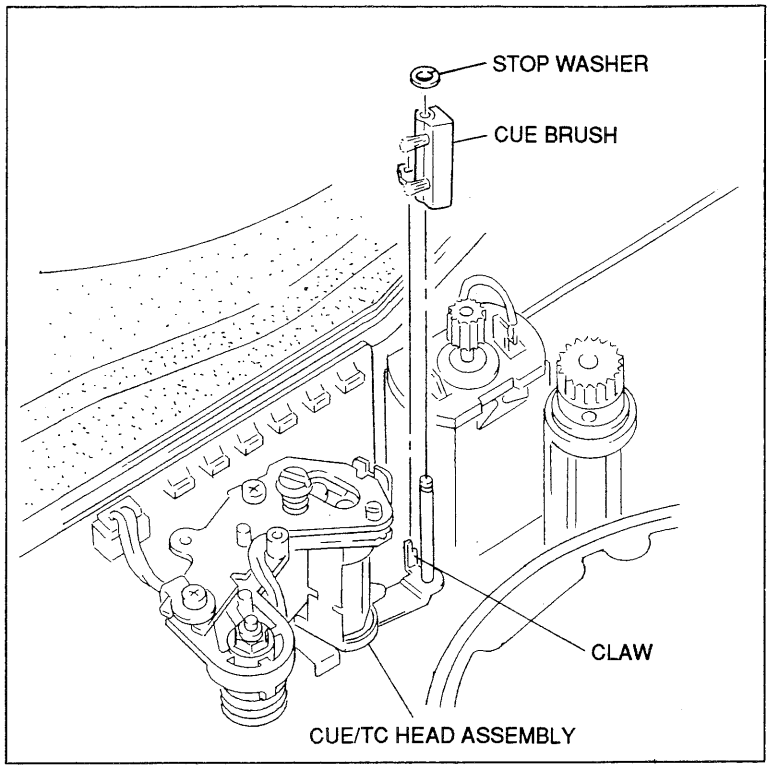
2. Manual eject assembly removal
Remove the manual eject assembly. (Refer to section 7-1-3.)

Installation

3. CUE brush replacement

(1) Remove the stop washer at the top of the CUE arm using a pair of tweezers and the CUE brush.

(2) Attach the CUE brush and the stop washer.



4. Manual eject assembly installation

Attach the manual eject assembly.
(Refer to section 7-1-3.)

5. Operation check

While pressing down the knob of the manual eject assembly, turn it in the direction or reverse direction of the arrow. When turning it, check that the CUE brush moves and touches onto the surface of the CUE head.

7-2-8. Brake Band Assembly Replacement

Overviews

Replacement
Band holder removal
Brake band assembly removal
S reel table cleaning
Brake band assembly installation
Band holder installation
Adjustments after replacement
Check of the tension regulator operating position
FWD back tension adjustment
Tape running adjustment

Note

If the felt surface of S brake band assembly became harden or wornout, replace the brake band assembly.

Preparations

1. Check that the unit is in the unthreading end mode.
2. Turn the power off.
3. Remove the front lid and the outside panel. (Refer to section 1-5.)
4. Remove the cassette compartment. (Refer to section 1-6.)

Note

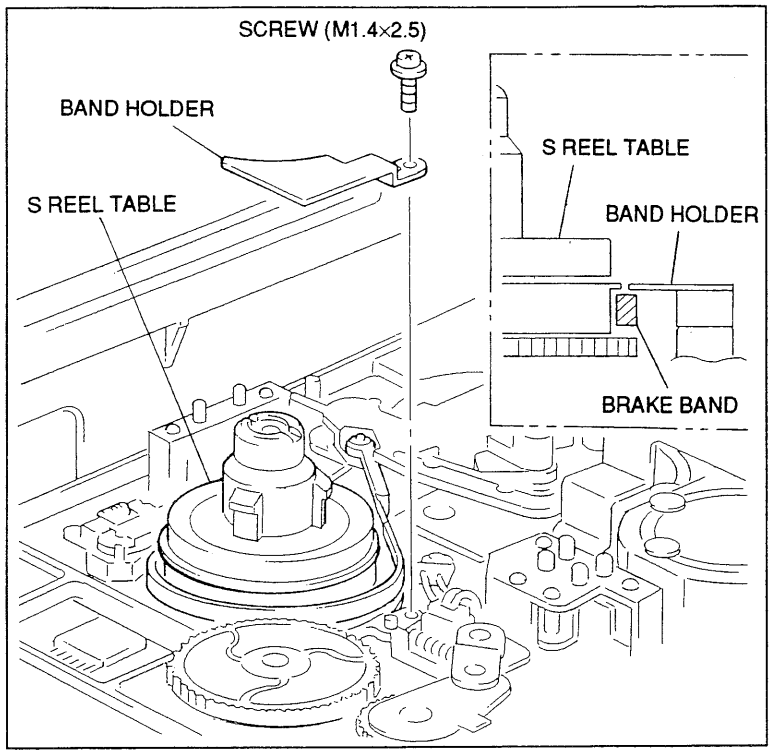
When replacing, prepare the new stopper washer (P/N 3-559-408-11).

Tools

- Stop washer fastening tool : J-6323-530-A
- Torque screwdriver bit (for M1.4) : J-6325-110-A
- Torque screwdriver bit (for M2) : J-6325-380-A
- Torque screwdriver (for 3 kg) : J-6325-400-A
- Cleaning cloth : 3-184-527-01
- Cleaning fluid : 9-919-573-01

Removal

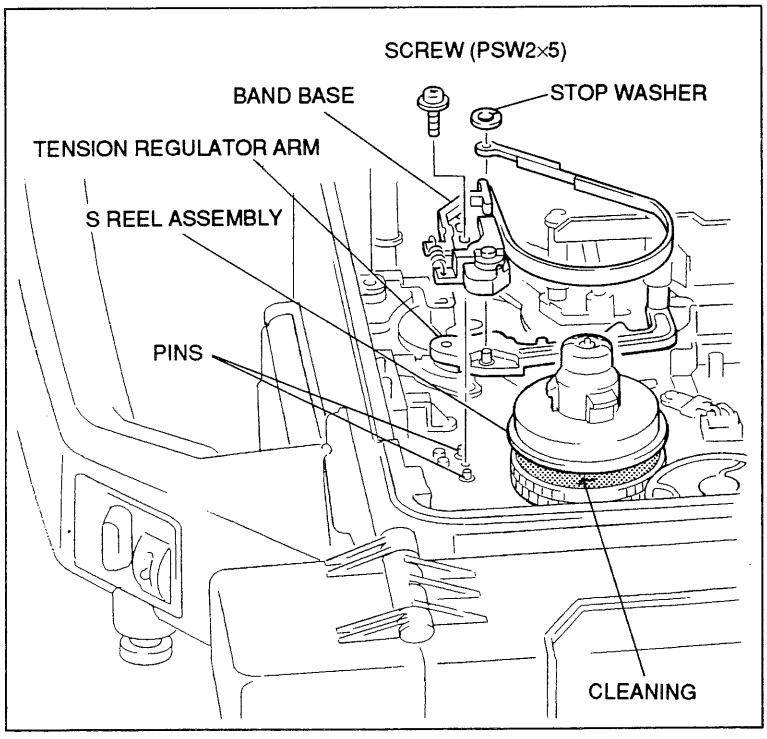
1. **Band holder removal**
   Using the torque screwdriver bit (for M1.4) remove the screw and the band holder.



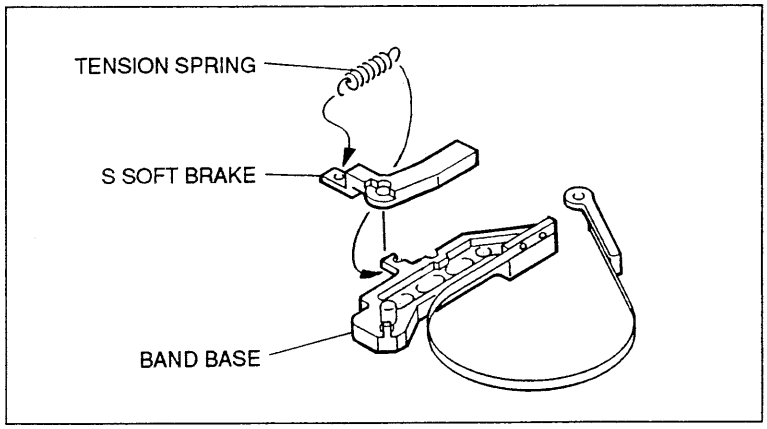
2. **Brake band assembly removal**
   (1) Remove the stop washer on the tension regulator arm.

   Note
   When removing, do not press the excessive force to the tension regulator arm.

   (2) Remove the screw and, base holder bracket and the band base.



(3) Remove the S soft bracket and the tension spring from the band base.



Installation

3. S reel table cleaning

Clean the contact surface with the brake band of the S reel table using a cleaning piece moistened with cleaning fluid.

4. Brake band assembly installation

(1) Attach the S soft brake and the tension spring to the band base of the new brake band assembly.

(2) Put the two pins on the chassis into the two holes of the band base of the new brake band assembly and temporarily attach together with the base holder using the torque screwdriver bit (for M2).

19×10^{-2} N•m (1.9 kgf•cm)

(3) Put the other hook of the brake band assembly in the shaft of the tension regulator arm.

Note

Take care not to scratch the brake band assembly because of bending.

(4) Attach the stop washer while supporting the arm by finger.

Note

When attaching, do not press the excessive force to the tension regulator arm.

5. Band holder installation

(1) Attach the band holder shown in the figure.

9×10^{-2} N•m (0.9 kgf•cm)

Notes

(a) Do not pinch the brake band between band holder and S reel table.

(b) Do not touch the S reel table with the band holder.

Adjustments after replacement

6. Check of the tension regulator operating position

(Refer to section 7-3-1.)

7. FWD back tension adjustment

(Refer to section 7-3-2.)

8. Tape running adjustment

(Refer to section 7-4-1.)

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7-2-9. T Soft Brake Assembly Replacement

Overviews

Replacement
T soft brake assembly removal
T reel table cleaning
T soft brake assembly installation
Adjustment after replacement
Brake torque check

Note

If the tape has some hunting and slack when rewinding, replace the T soft brake assembly.

Preparations

1. Check that the unit is in the unthreading end mode.
2. Turn the power off.
3. Remove the front lid and the outside panel. (Refer to section 1-5.)
4. Remove the cassette compartment. (Refer to section 1-6.)

Note

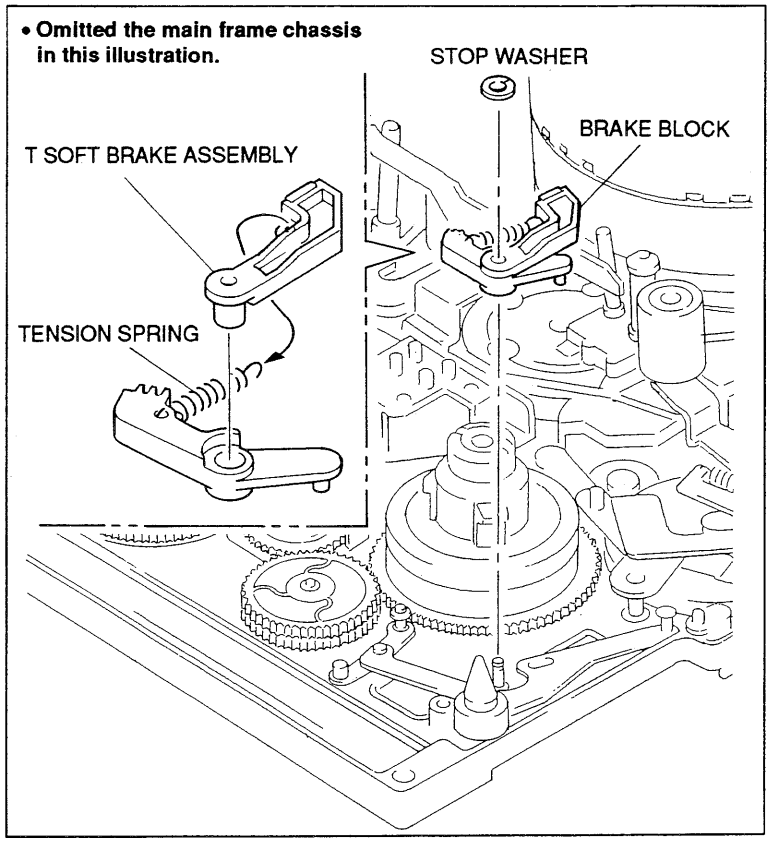
When replacing, prepare the new stopper washer (P/N 3-559-408-11).

Tools

- Stop washer fastening tool : J-6323-530-A
- Cleaning cloth : 3-184-527-01
- Cleaning fluid : 9-919-573-01

Removal

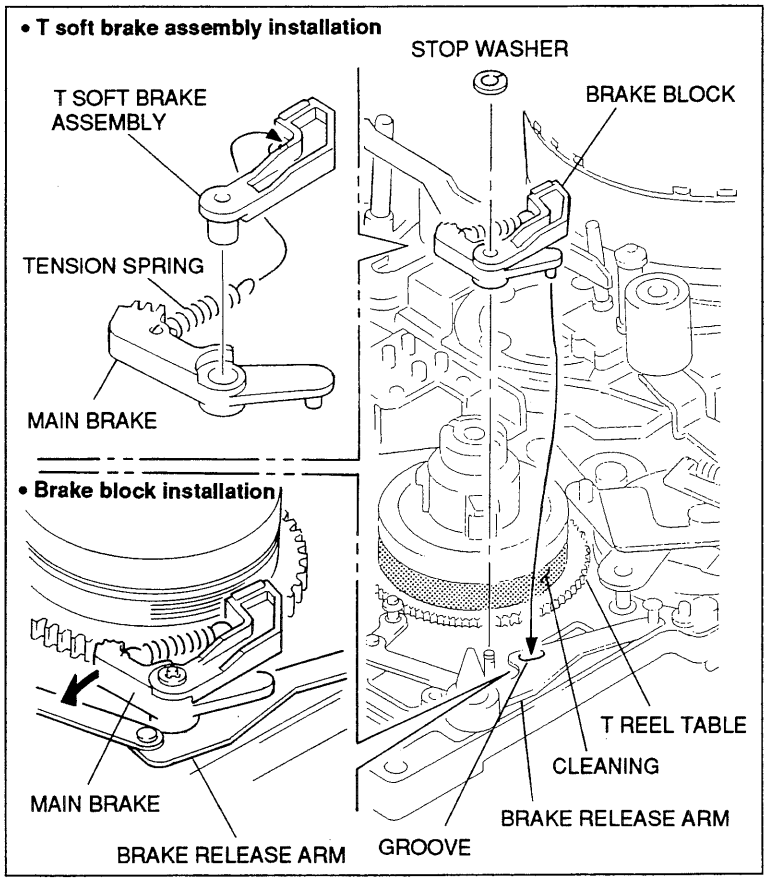
1. **T soft brake assembly removal**
   (1) Remove the stop washer and the brake block.
   (2) Remove the T soft brake assembly from the brake block.
   (3) Remove the hook of the tension spring from the T soft brake.



Installation

2. T reel table cleaning
Clean the contact surface with the brake of the T reel table using a cleaning cloth moistened with cleaning fluid.

3. T soft brake assembly installation
(1) Hook the tension spring to the new T soft brake assembly.
(2) Put the boss of the T soft brake assembly in the hole of the main brake.
(3) Put the brake block in the shaft of the chassis and move the main brake in the direction of the arrow. In this way the pin of the main brake will put in the groove of the brake release arm.
(4) Install the stop washer.



Adjustment after replacement

4. Brake torque check
(Refer to section 7-3-3.)

7-2-10. S/T Idler Assembly Replacement

Overviews

Replacement
Band holder removal (Only when replacing the S idler assembly)
S or T idler assembly removal
Cleaning of the installation shaft
S or T idler assembly installation
Band holder installation (Only when replacing the S idler assembly)

Notes

The S idler and the T idler assemblies are the different part, but the replacement procedures are the same. The adjustment after replacement do not need, but the operation checks of PLAY, F.FWD and REW need.

Preparations

1. Turn the power off.
2. Remove the front lid and the outside panel. (Refer to section 1-5.)
3. Remove the cassette compartment. (Refer to section 1-6.)

Note

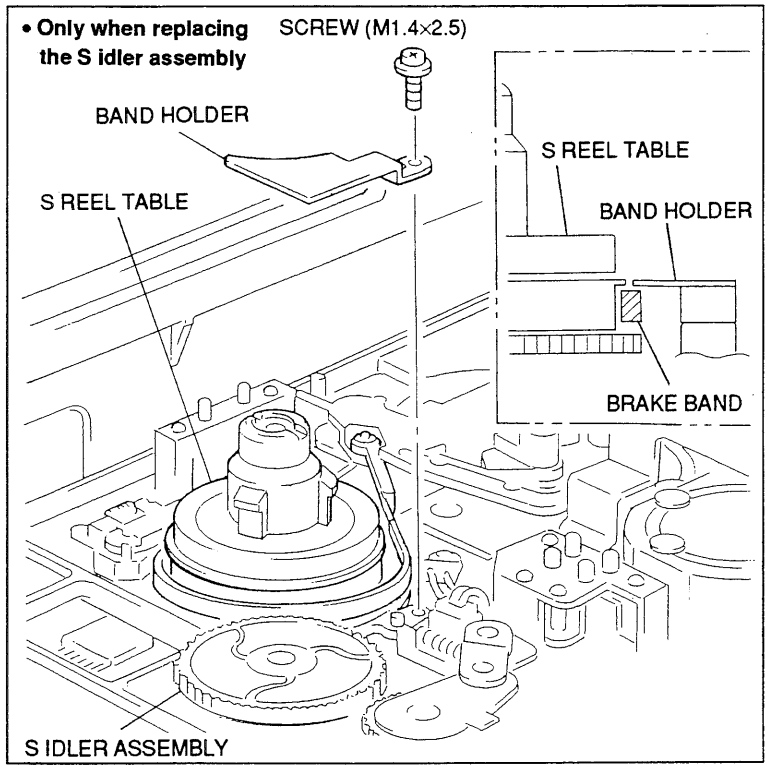
When replacing, prepare the new stopper washer (P/N 3-559-408-11).

Tools

- Stop washer fastening tool : J-6323-530-A
- Torque screwdriver bit (for M 1.4) : J-6325-110-A
- Torque screwdriver (for 3 kg) : J-6325-400-A
- Cleaning cloth : 3-184-527-01
- Cleaning fluid : 9-919-573-01
- Oil : 7-661-018-18

Removal

1. **Band holder removal**
   (Only when replacing the S idler assembly)
   Remove the screw and the band holder.



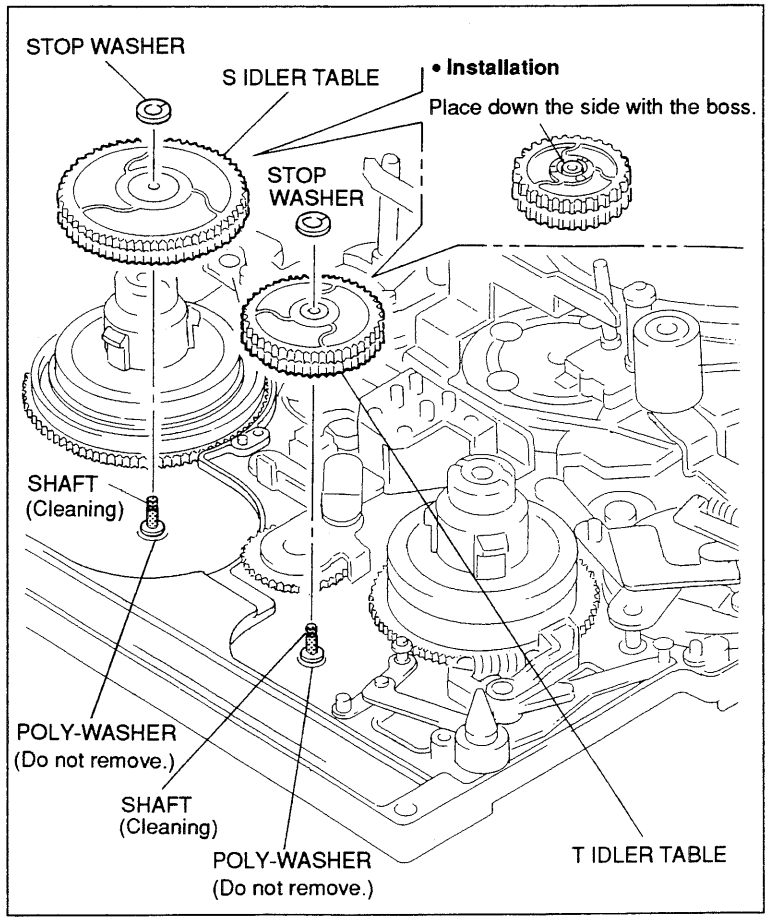
2. **S or T idler assembly removal**
   Remove the stop washer and the S or T idler assembly.

   Note
   Do not remove the poly-washer under the S or T idler assembly from the shaft.

Installation

3. **Cleaning of the installation shaft**
   Clean the installation shaft using a cleaning piece moistened with cleaning fluid.

4. **S or T idler assembly installation**
   (1) Apply 1/4 drop of oil to the installation shaft and smear it to make a thin film.
   (2) Place down the side with the boss of the new S or T idler assembly and put in the shaft of the chassis.
   (3) Attach the stop washer.



5. Band holder installation
(Only when replacing the S idler assembly)
Attach the band holder as shown in the figure.

9×10^{-2} N•m (0.9 kgf•cm)

Notes

(a) Do not pinch the brake band between band holder and S reel table.
(b) Do not touch the S reel table with the band holder.

7-2-11. Swing Gear Assembly Replacement

Overviews

Replacement
Removal of the swing gear assembly fixing screw
Mechanical deck assembly removal
Swing gear assembly removal
Swing gear assembly installation
Mechanical deck assembly installation
Swing gear assembly fixation
Adjustment after replacement
Belt tension adjustment

Notes

When replacing, remove the mechanical deck assembly from the unit. When removing the mechanical deck assembly, take care not to scratch the video heads, drum and other parts.

Preparations

1. Turn the power off.
2. Remove front lid and the outside panel. (Refer to section 1-5.)
3. Remove the DC-DC converter. (Refer to section 1-6.)

Tools

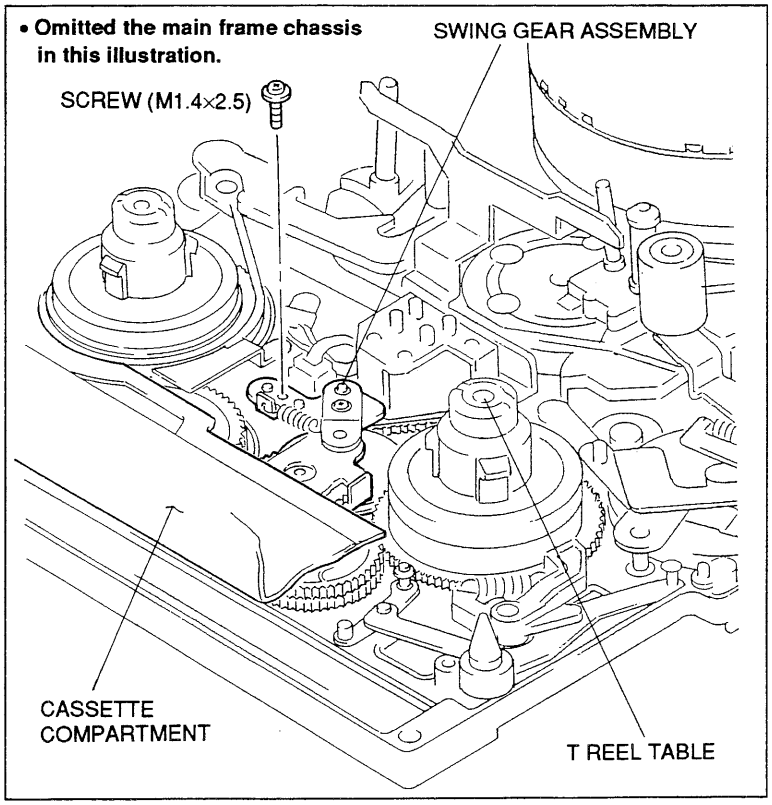
- Hexagon bit (across 1.5 mm) : J-6326-120-A
- Torque screwdriver bit (for M1.4) : J-6325-110-A
- Torque screwdriver bit (for M2) : J-6325-380-A
- Torque screwdriver (for 3 kg) : J-6325-400-A

Removal

1. **Removal of the swing gear assembly fixing screw**
   (1) Remove a screw.

Notes

Even if removing the screw, the gear assembly can not remove from the unit.
After carrying out step 2 and removing the mechanical deck assembly, remove the swing gear assembly from the unit.



2. Mechanical deck assembly removal

(1) Remove the four screws shown in the figure using the hexagon bit.

Note

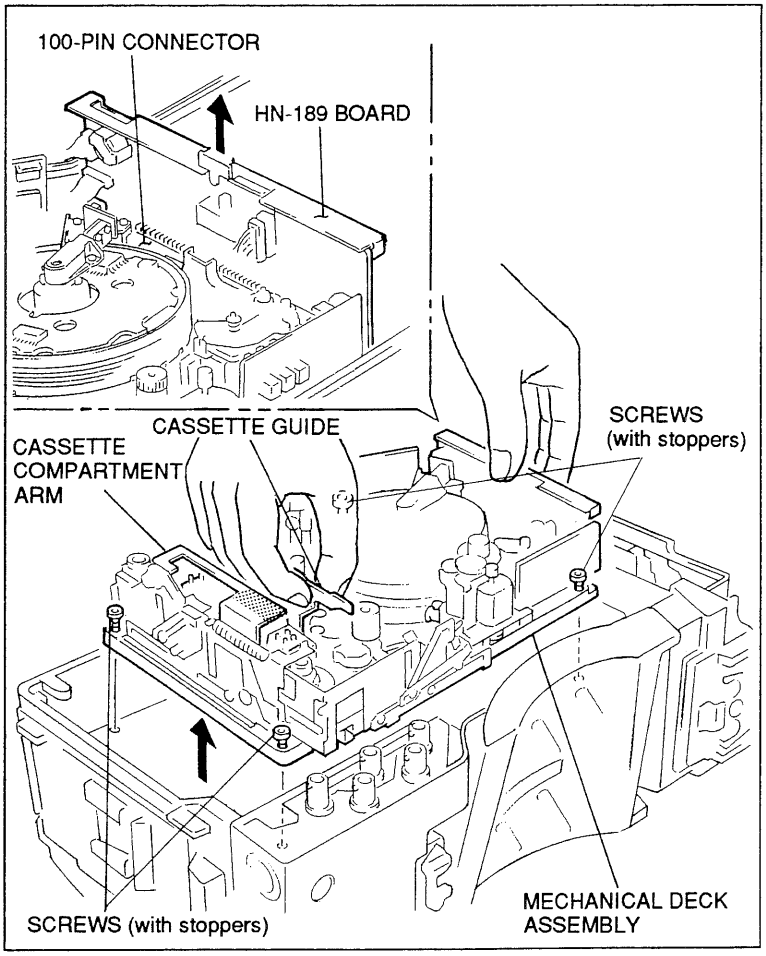
These screws can not remove due to the stoppers.

(2) Lift up the ornamental bracket of the HN-189 board and disconnect the 100-pin connector that connects to the mother board at the bottom of the HN-189 board.

(3) While holding the shaded portion of the arm on the cassette compartment, or cassette guide, and HN-189 board shown in the figure, lift up and remove the mechanical deck assembly from the unit.

Notes

- When removing, take care not to scratch the video heads, drum and other parts.
- Never put the removed mechanical deck assembly to bottom side down or up side down on the desk.
- In the replacement, put the mechanical deck assembly as shown in the figure and carry out the following steps while holding it by hand.



3. Swing gear assembly removal

(1) Remove the timing belt which hooks to the swing gear assembly from the back side of the mechanical deck assembly.

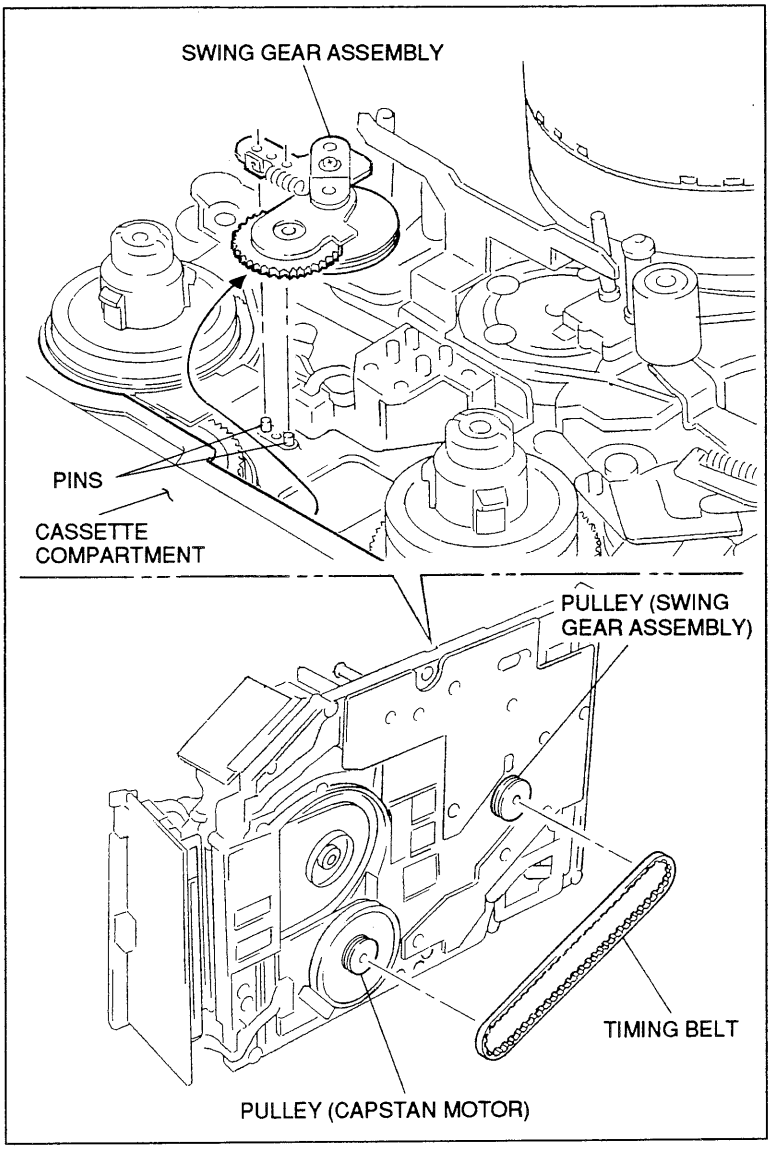
(2) Remove the swing gear assembly from the top side of the mechanical deck assembly.

Installation

4. Swing gear assembly installation

(1) While putting the twoholes of the new swing gear assembly in the two pins of the mechanical deck assembly, put the new swing gear assembly to the relevant position.

(2) Attach the timing belt to the pulleys of the swing gear assembly and the capstan motor.



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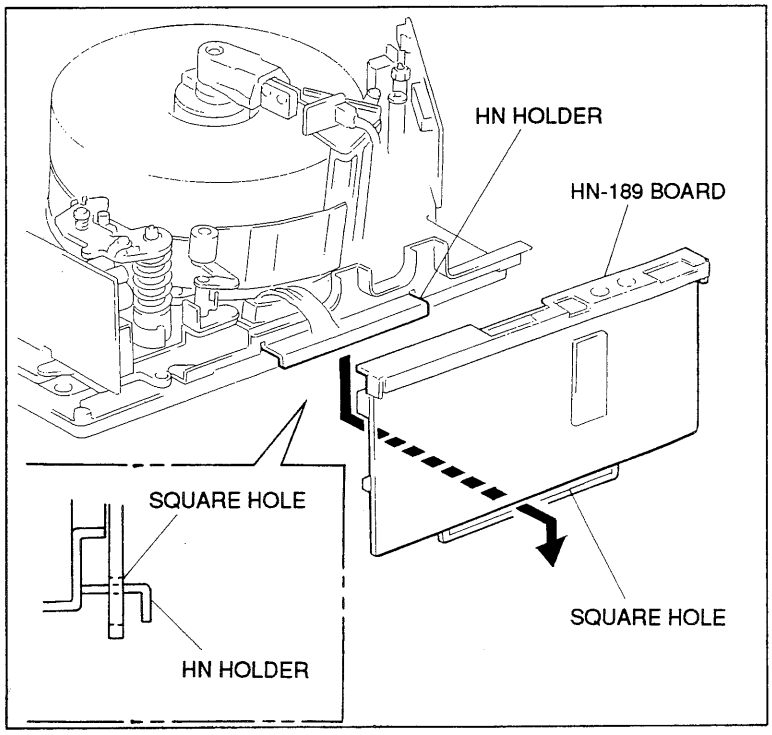
5. Mechanical deck assembly installation

(1) Check that the bending portion of the HN holder of the mechanical deck assembly puts in the square hole of the forcement bracket which attaches to the HN-189 board.

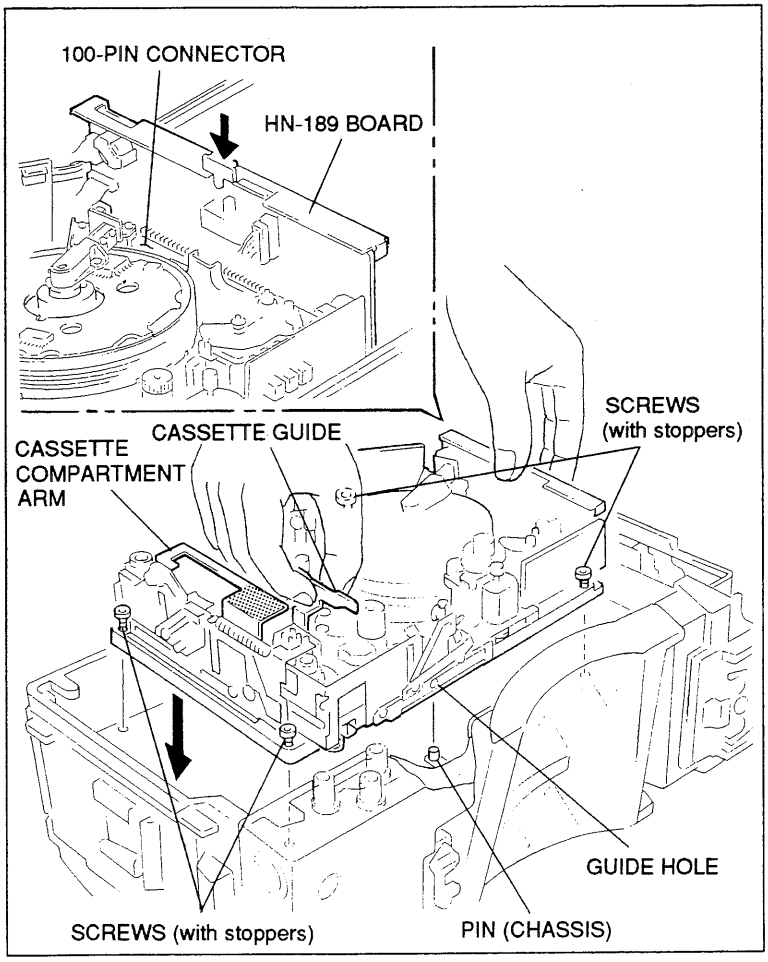


(2) Hold the shaded portion of the arm on the cassette compartment, or cassette guide, and HN-189 board shown in the figure and align the two guide holes on the mechanical deck assembly with the two pins of the chassis.

(3) Push down the ornamental bracket of the HN-189 board and connect the 100-pin connector to the mother board.

(4) Tighten the four screws of the mechanical deck assembly.

19×10^{-2} N•m (1.9 kgf•cm)



6. **Swing gear assembly fixation**
   After checking that the two pins of the mechanical deck assembly put in the two holes of the swing gear assembly, tighten the screw.
   9×10^{-2} N•m (0.9 kgf•cm)

Adjustment after replacement

7. **Belt tension adjustment**
   (Refer to section 7-3-4.)

7-2-12. Timing Belt Replacement

Overviews

Replacement
Mechanical deck assembly removal
Timing belt removal
Cleaning of the pulleys
Timing belt installation
Mechanical deck assembly installation
Adjustment after replacement
Belt tension adjustment

Notes

When replacing, remove the mechanical deck assembly from the unit. When removing the mechanical deck assembly, take care not to scratch the video heads, drum and other parts.

Preparations

1. Turn the power off.
2. Remove the front lid and the outside panel. (Refer to section 1-5.)
3. Remove the DC-DC converter. (Refer to section 1-6.)

Tools

- Hexagon bit (across 1.5 mm) : J-6326-120-A
- Torque screwdriver bit (for M1.4) : J-6325-110-A
- Torque screwdriver (for 3 kg) : J-6325-400-A
- Cleaning cloth : 3-184-527-01
- Cleaning fluid : 9-919-573-01

Removal

1. Mechanical deck assembly removal

(1) Remove the four screws shown in the figure using the hexagon bit.

Note

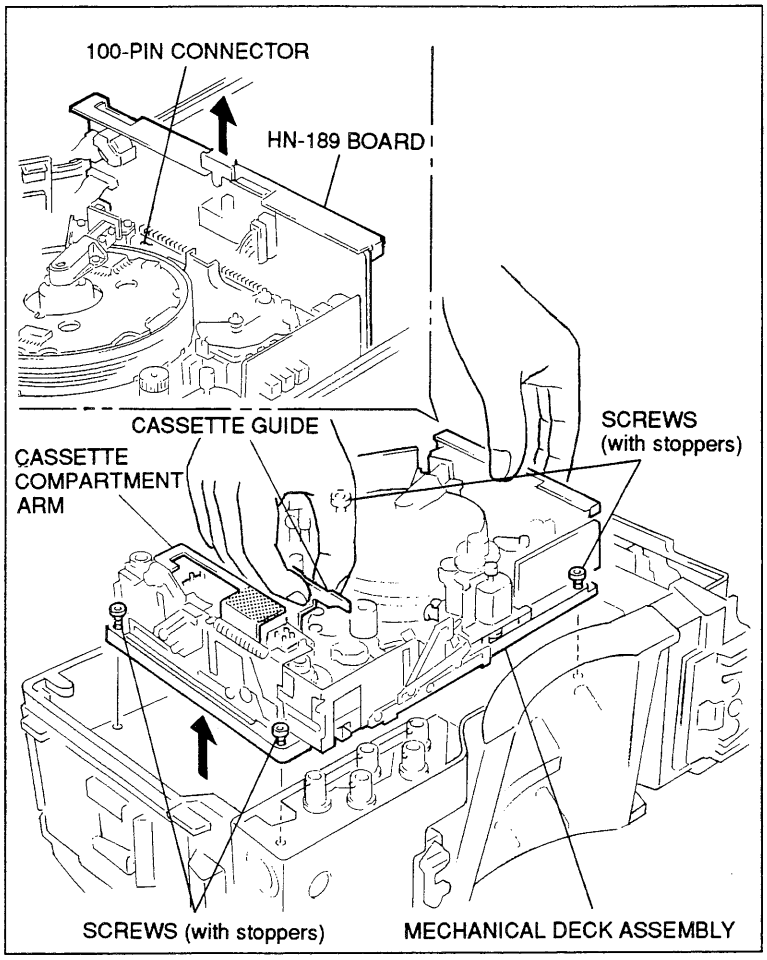
These screws can not remove due to the stoppers.

(2) Lift up the ornamental bracket of the HN-189 board and disconnect the 100-pin connector that connects to the mother board at the bottom of the HN-189 board.

(3) While holding the shaded portion of the arm on the cassette compartment, or cassette guide, and HN-189 board shown in the figure, lift up and remove the mechanical deck assembly from the unit.

Notes

- When removing, take care not to scratch the video heads, drum and other parts.
- Never put the removed mechanical deck assembly to bottom side down or up side down on the desk.
- In the replacement, put the mechanical deck assembly as shown in the figure and carry out the following steps while holding it by hand.



2. Timing belt removal

(1) Loosen the screw of the swing gear assembly.

(2) Remove the timing belt.

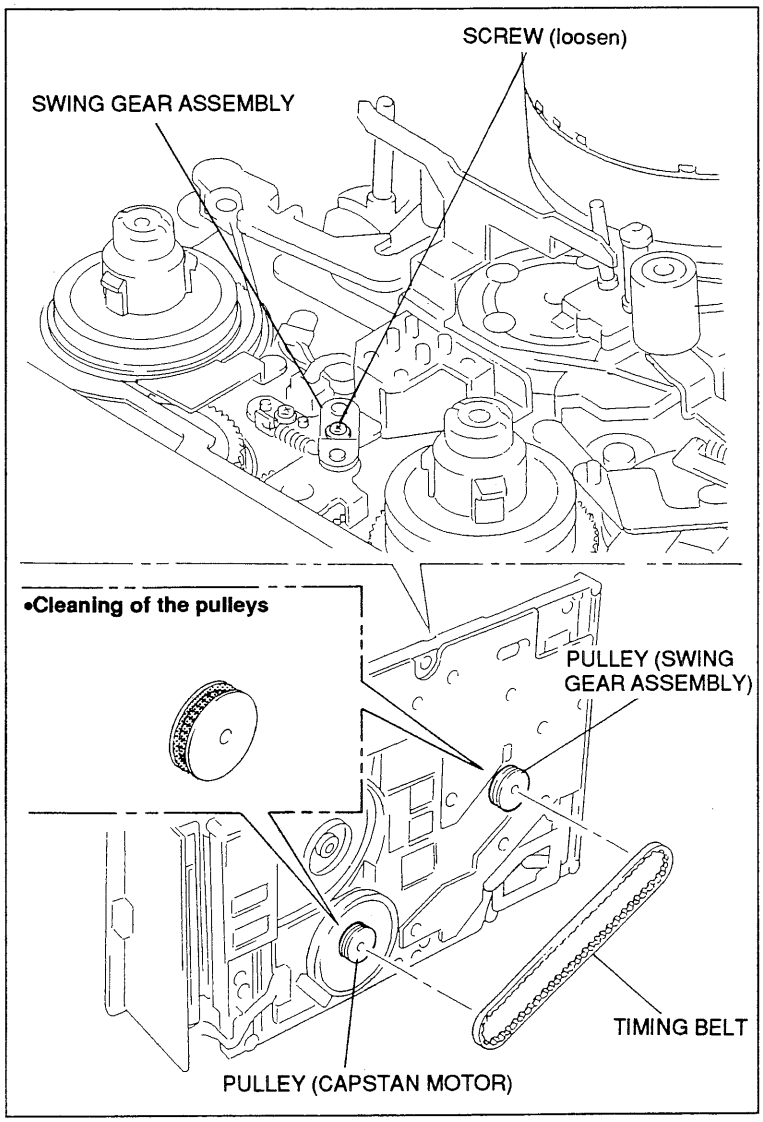
Installation

3. Cleaning of the pulleys

Clean the pulleys of the swing gear assembly and capstan motor using a cleaning cloth moistened with cleaning fluid.

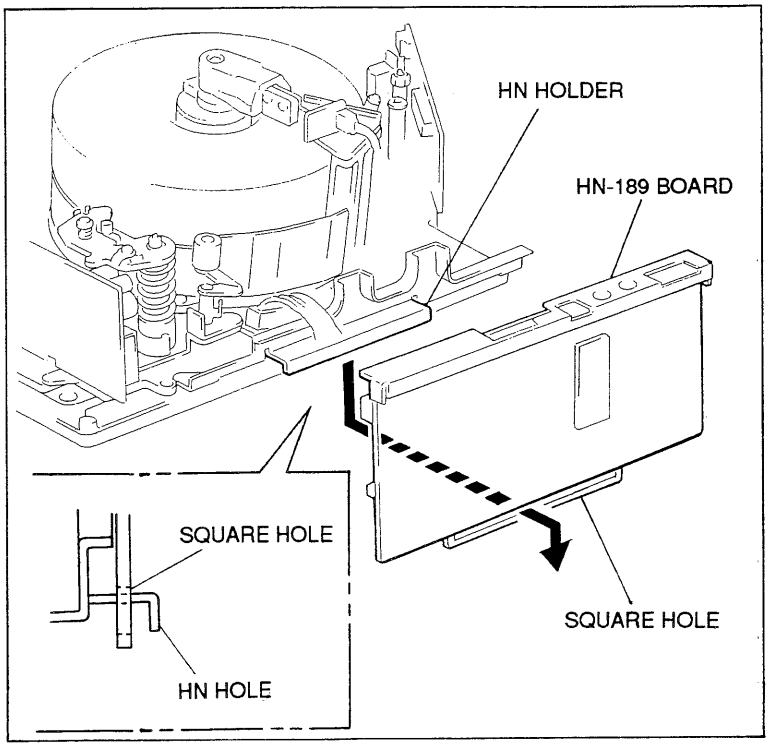
4. Timing belt installation

(1) Attach the timing belt to the pulleys of the swing gear assembly and capstan motor.



5. Mechanical deck assembly installation

(1) Check that the bending portion of the HN holder of the mechanical deck assembly puts in the square hole of the reinforcement bracket which attaches to the HN-189 board.

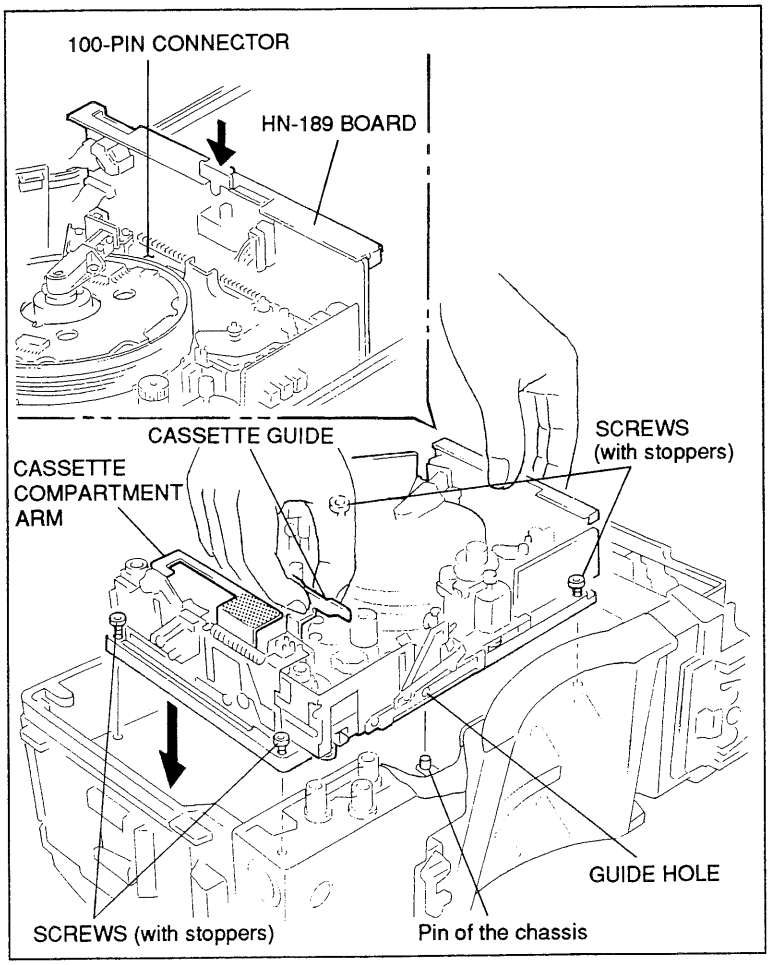


(2) Hold the shaded portion of the arm on the cassette compartment, or cassette guide, and HN-189 board shown in the figure and align the two guide holes on the mechanical deck assembly with the two pins of the chassis.

(3) Push down the ornamental bracket of the HN-189 board and connect the 100-pin connector to the mother board.

(4) Tighten the four screws of the mechanical deck assembly.

19×10^{-2} N•m (1.9 kgf•cm)



Adjustment after replacement

6. Belt tension adjustment

(Refer to section 7-3-4.)

7-2-13. Capstan Motor Replacement

Overviews

Replacement
Manual eject assembly removal
Mechanical deck assembly removal
Capstan motor removal
Capstan motor installation
Mechanical deck assembly installation
Manual eject assembly installation
Adjustments after replacement
Belt tension adjustment
Automatic servo adjustment

Notes

When replacing, remove the mechanical deck assembly from the unit. When removing the mechanical deck assembly, take care not to scratch the video heads, drum and other parts.

Preparations

1. Turn the power off.
2. Remove the front lid and the outside panel. (Refer to section 1-5.)
3. Remove the DC-DC converter. (Refer to section 1-6.)

Tools

- Hexagon bit (across 1.5mm) : J-6326-120-A
- Torque screwdriver bit (for M2) : J-6325-380-A
- Torque screwdriver bit (for M1.4) : J-6325-110-A
- Torque screwdriver (for 3kg) : J-6325-400-A
- Cleaning cloth : 3-184-527-01
- Cleaning fluid : 9-919-573-01

Removal

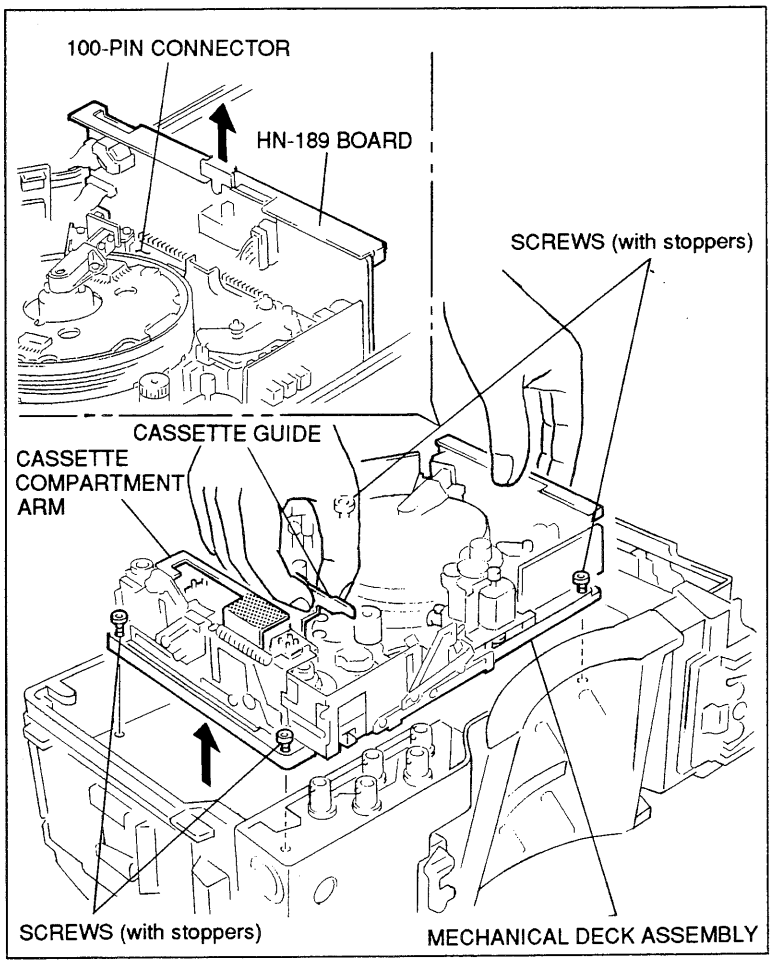
1. **Manual eject assembly removal**
   Remove the screw and the manual eject assembly. (Refer to section 7-1-3.)

2. **Mechanical deck assembly removal**
   (1) Remove the four screws shown in the figure using the hexagon bit.

   Note
   These screws can not remove due to the stoppers.

   (2) Lift up the ornamental bracket of the HN-189 board and disconnect the 100-pin connector that connects to the mother board at the bottom of the HN-189 board.
   (3) While holding the shaded portion of the arm on the cassette compartment, or cassette guide, and HN-189 board shown in the figure, lift up and remove the mechanical deck assembly from the unit.

   Notes
   - When removing, take care not to scratch the video heads, drum and other parts.
   - Never put the removed mechanical deck assembly to bottom side down or up side down on the desk.
   - In the replacement, put the mechanical deck assembly as shown in the figure and carry out the following steps while holding it by hand.



3. Capstan motor removal

(1) Loosen the screw of the swing gear assembly.
(2) Remove the timing belt which hooks to the capstan motor pulley.
(3) Disconnect the connector which connect to the board of the capstan motor.
(4) While holding the capstan motor by hand, remove the three screws from the top surface of the mechanical deck assembly and remove the capstan motor from the back side of the mechanical deck assembly.

Note
Take care not to fall the capstan motor.

Installation

4. Capstan motor installation

(1) Place the new capstan motor in the direction of the figure, and put the capstan motor through the hole of the mechanical deck assembly and tighten the three screws.

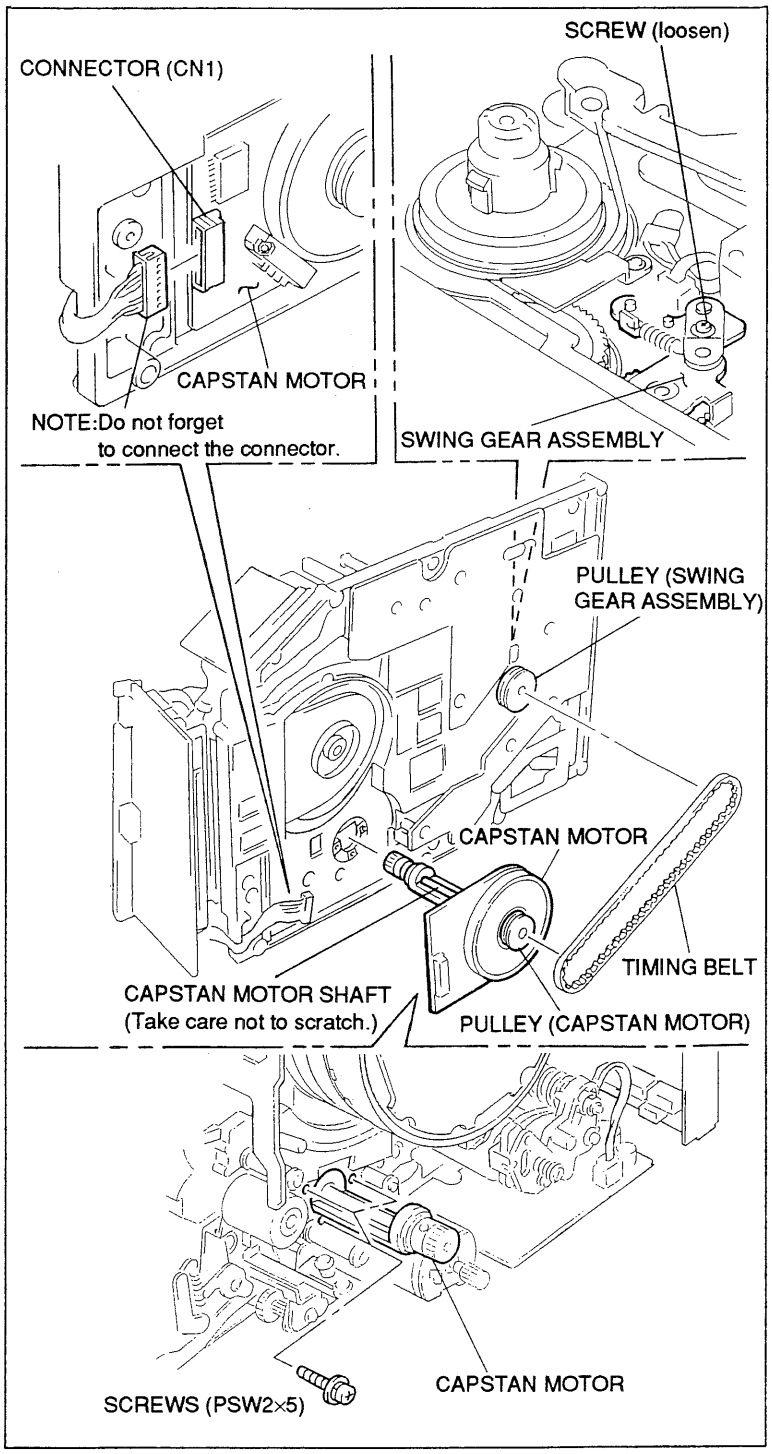
19×10^{-2} N•m (1.9 kgf•cm)

Note
When putting through the hole, take care not to scratch the capstan motor shaft.

(2) Connect the connectors on the board of the capstan motor.

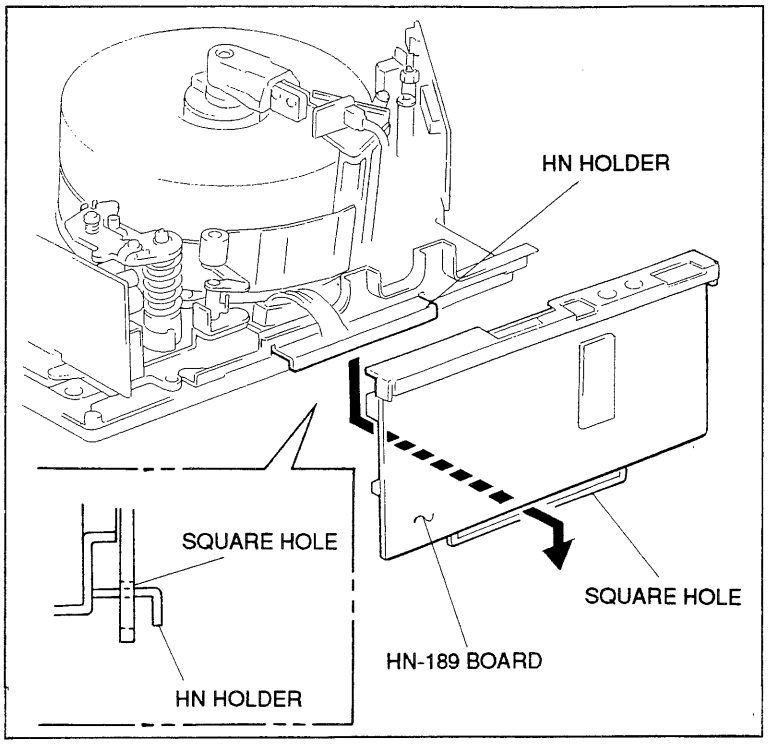
Note
Do not forget to connect connector.

(3) Attach the timing belt to the pulleys of the swing gear assembly and the capstan motor.



5. Mechanical deck assembly installation

(1) Check that the bending portion of the HN holder of the mechanical deck assembly puts in the square hole of the reinforcement bracket which attaches to the HN-189 board.

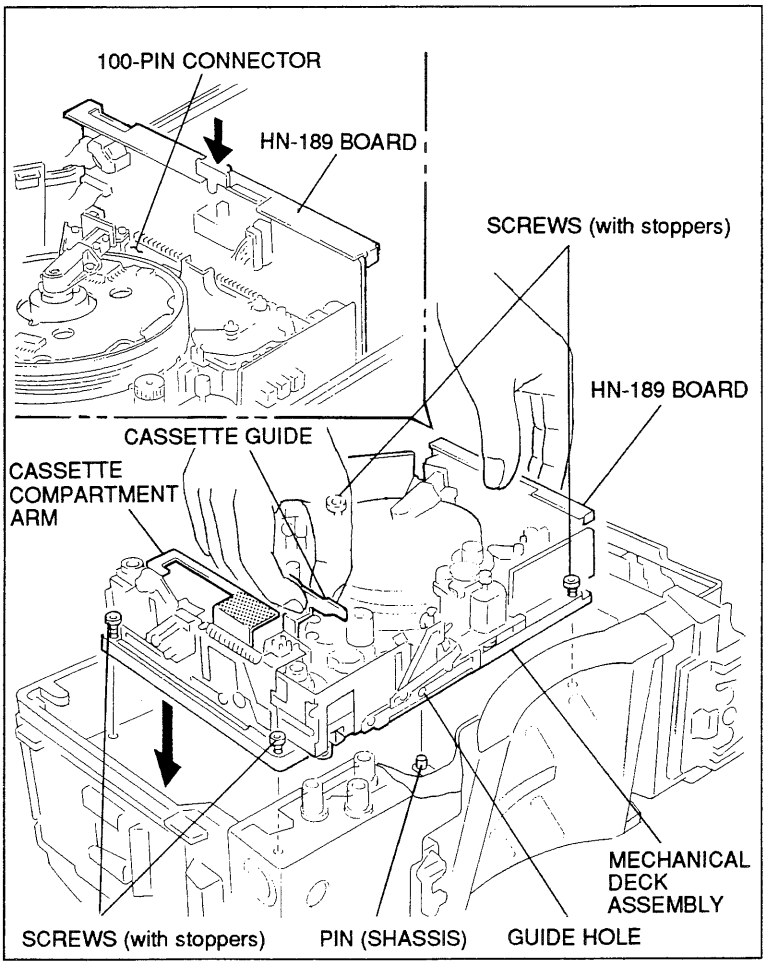


(2) Hold the shaded portion of the arm on the cassette compartment, or cassette guide, and HN-189 board shown in the figure and align the two guide holes on the mechanical deck assembly with the two pins of the chassis.

(3) Push down the ornamental bracket of the HN-189 board and connect the 100-pin connector to the mother board.

(4) Tighten the four screws of the mechanical deck assembly.

 19×10^{-2} N•m (1.9 kgf•cm)



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6. **Manual eject assembly installation**
   (1) Attach the manual eject assembly.
   (Refer to section 7-1-3.)
   (2) While pressing down the knob of the manual eject assembly, turn it in the direction or reverse direction of the arrow. When turning it, check that the gears correctly engage and turn.

Adjustments after replacement

7. **Belt tension adjustment**
   (Refer to section 7-3-4.)

8. **Servo system adjustment**
   (Refer to section 5-3-1.)

7-2-14. CTL Head Replacement

Overviews

Replacement
Entrance head assembly removal
CTL head replacement
Entrance head assembly installation
Entrance head assembly cleaning
Adjustments after replacement
Tape running adjustment
Video tracking adjustment
CTL head height adjustment
CTL head position adjustment
CUE/TC head position adjustment

Preparations

1. Check that the unit is in the unthreading end mode.
2. Turn the power off.
3. Remove the front lid and the outside panel. (Refer to section 1-5.)

Tools

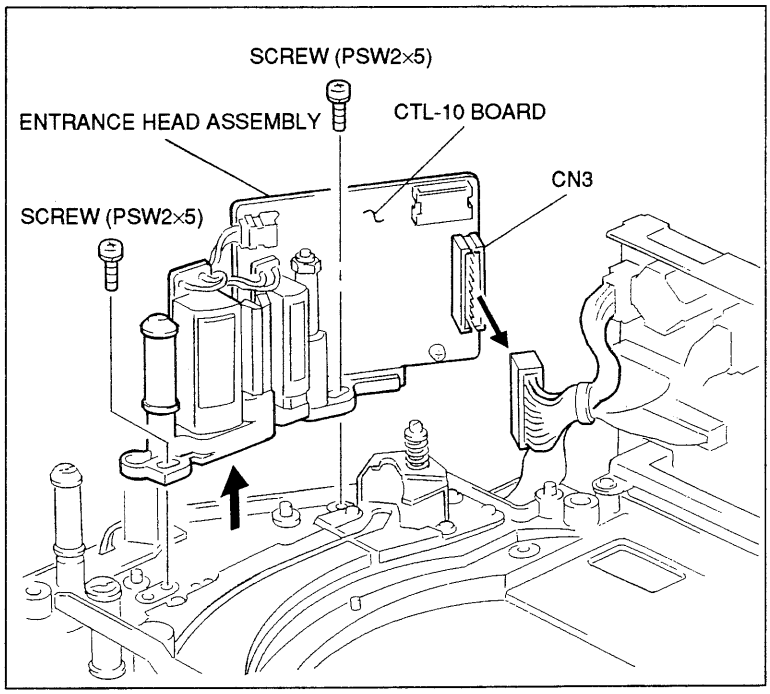
- Torque screwdriver bit (for M2) : J-6325-380-A
- Torque screwdriver bit (for 3 kg) : J-6325-400-A
- Cleaning cloth : 3-184-527-01
- Cleaning fluid : 9-919-573-01

Removal

1. **Entrance head assembly removal**
   (1) Disconnect the connector CN3 on the CTL-10 board.
   (2) Remove the two screws and the entrance head assembly from the unit.

Note

Take care not to scratch the video heads, drum, erase head, tape guides and other parts.

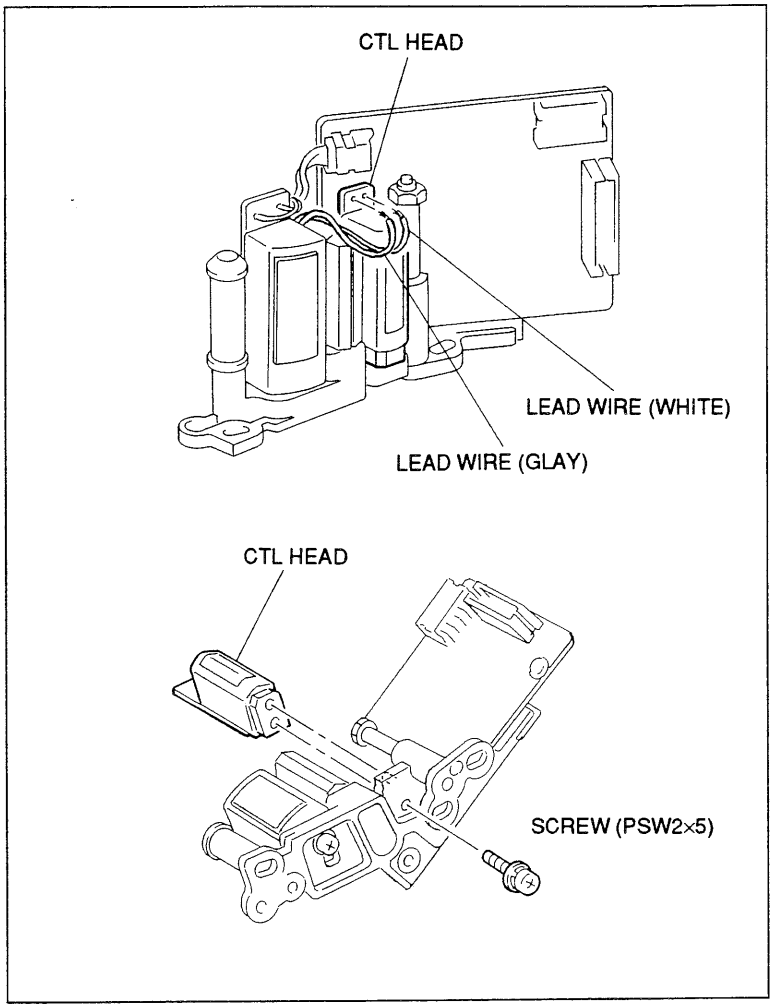


Installation

2. CTL head replacement

(1) Desolder the two leads from the CTL head.
(2) Remove the screw at the back side of the CTL head assembly and the CTL head.
(3) Put the boss of CTL bracket in the hole at the bottom of the new CTL head and tighten the screw.
19×10^{-2} N•m (1.9 kgf•cm)
(4) Solder the two leads to the printed circuit board of the CTL head. (Refer to the (1) in the step 2.)

Note
Never mistake the soldering positions.
If mistaking, the serious tape interchangeability trouble will occure.



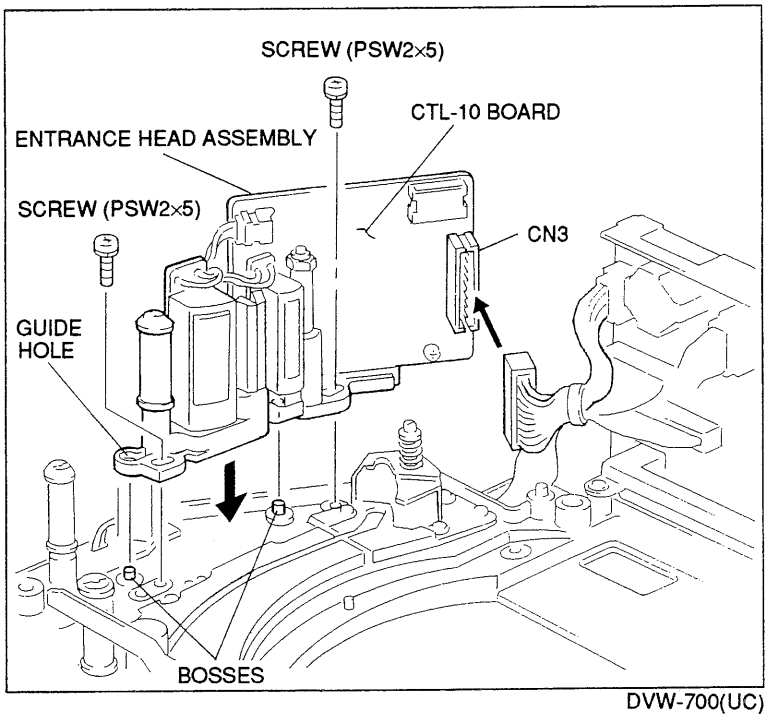
3. Entrance head assembly installation

(1) Put the two bosses of the chassis in the two reference guide holes of the entrance head assembly and tighten the two screws.
19×10^{-2} N•m (1.9 kgf•cm)
(2) Connect the harness connector to the connector CN3 on the CTL-10 board.

4. Entrance head assembly cleaning

(1) Clean the CTL head, erase head, tape cleaner and tape guides using a cleaning cloth moistened with cleaning fluid.

Note
After cleaning, be sure to wipe using a dry cleaning cloth.



Adjustments after replacement

5. **Tape running adjustment**
   (Refer to section 7-4-1.)

6. **Video tracking adjustment**
   (Refer to section 7-4-2.)

7. **CTL head height adjustment**
   (Refer to section 7-4-3.)

8. **CTL head position adjustment**
   (Refer to section 7-4-4.)

9. **CUE/TC head position adjustment**
   (Refer to section 7-4-8.)

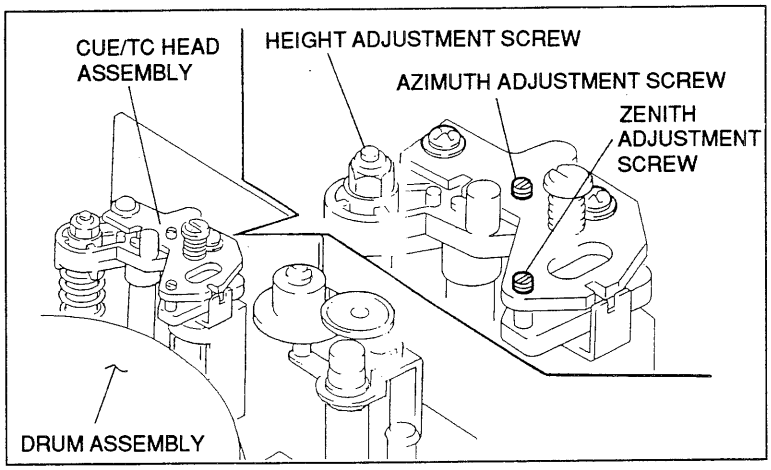
7-2-15. CUE Head Replacement

Overviews

Replacement
Manual eject assembly removal
Cassette compartment removal
Gear block assembly removal
CUE head block removal
CUE head replacement
CUE head block installation
Gear block assembly installation
Cleaning of the head
Cassette compartment installation
Manual eject assembly installation
Operation check
Adjustments after replacement
Tape running check
Video tracking adjustment
CUE head height adjustment
CTL head position adjustment
CUE/TC head position adjustment
Audio system adjustment

Notes

When replacing, never tighten or loosen other screws except the relevant screws described in the following steps.
If tightening or loosening, the azimuth and zenith of the CUE head will change, and the serious trouble will occur at the tape path and video tracking adjustments.



Preparations

1. Check that the unit is in the unthreading end mode.
2. Turn the power off.
3. Remove the front lid and the outside panel. (Refer to section 1-5.)

Note

When replacing, prepare the new stopper washer (P/N 3-559-408-11).

Tools

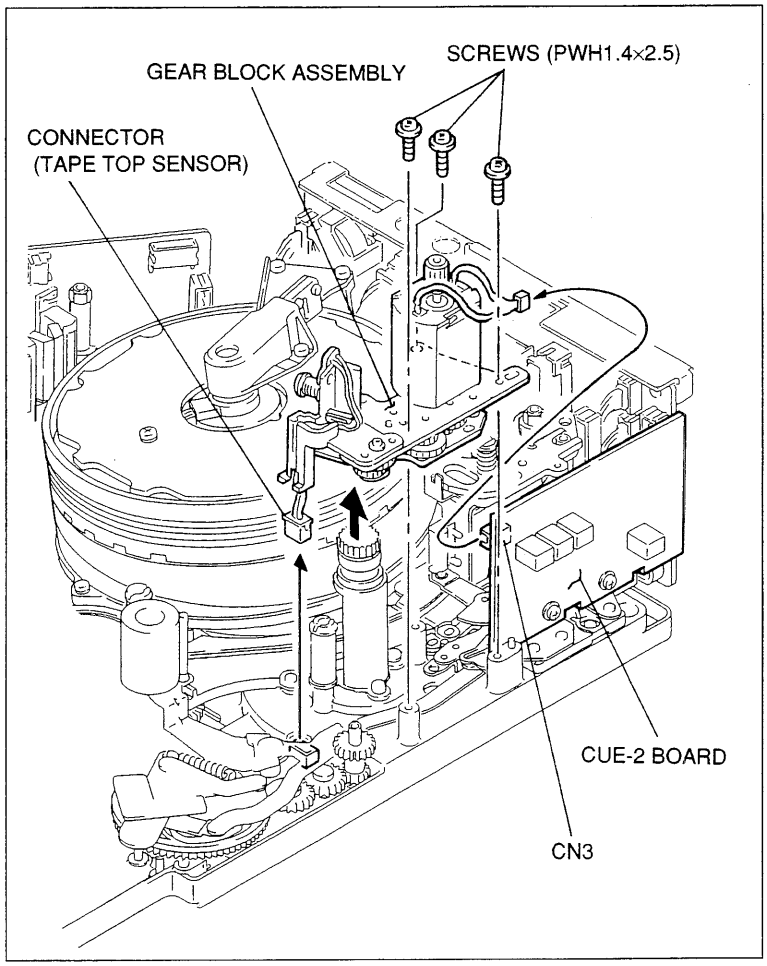
- Stop washer fastening tool : J-6323-530-A
- Torque screwdriver bit (for M1.4) : J-6325-110-A
- Torque screwdriver bit (for M2) : J-6325-380-A
- Torque screwdriver (for 3kg) : J-6325-400-A
- Cleaning cloth : 3-184-527-01
- Cleaning fluid : 9-919-573-01

Removal

1. **Manual eject assembly removal**
   Remove the screw and the manual eject assembly. (Refer to section 7-1-3.)

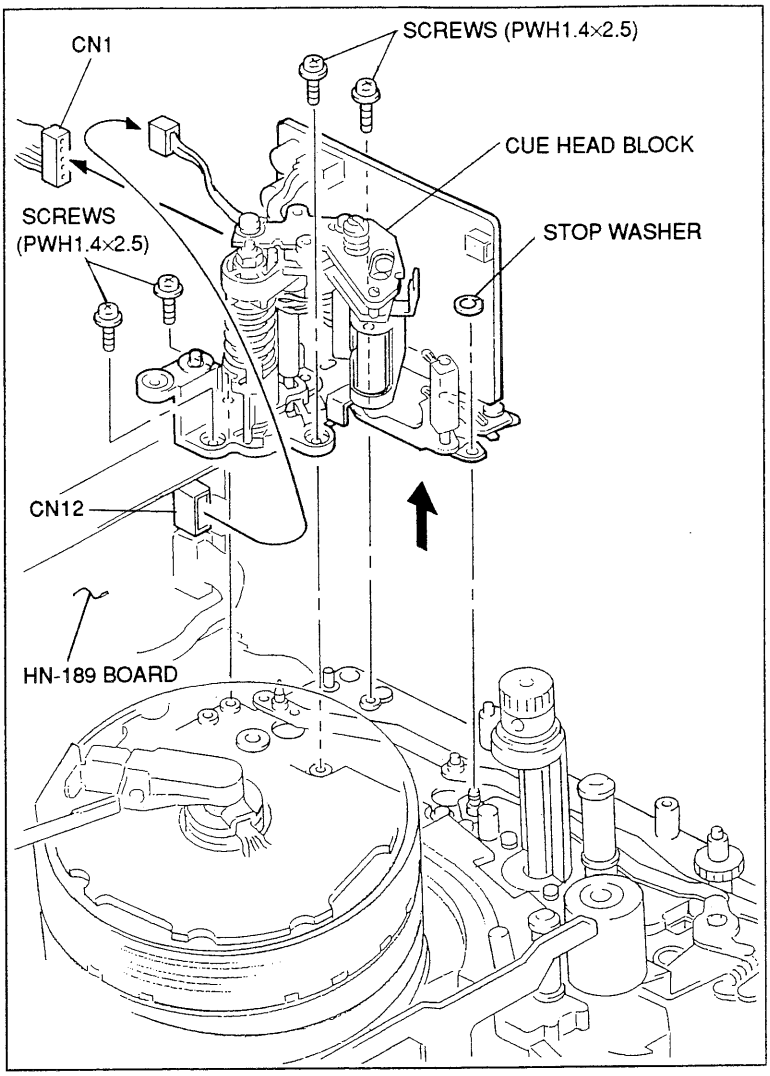
2. **Cassette compartment removal**
   Remove the three screws and the cassette compartment.
   (Refer to section 1-6.)

3. **Gear block assembly removal**
   (1) Disconnect the connector CN3 on the CUE-2 board which attaches to the CUE head block.
   (2) Remove the three screws.
   (3) Lift up the gear block assembly and disconnect the connector of the tape top sensor from the SE-210 board. In this way the gear block assembly will remove.



4. CUE head block assembly removal

(1) Disconnect the connector CN12 on the HN-189 board.
(2) Remove the video head cleaner assembly. (Refer to section 7-2-6.)
(3) Remove the four screws and the stop washer on the CUE cleaner link and remove the CUE head block.
(4) Disconnect the connector CN1 on the CUE-2 board.



Installation

5. CUE head replacement

(1) Disconnect the connector CN2 on the CUE-2 board.

(2) Remove the screw and open the CUE-2 board.

(3) Remove the two screws at the top of the CUE head block and the CUE head. In this way the shield case and the adjustment plate (R) will remove.

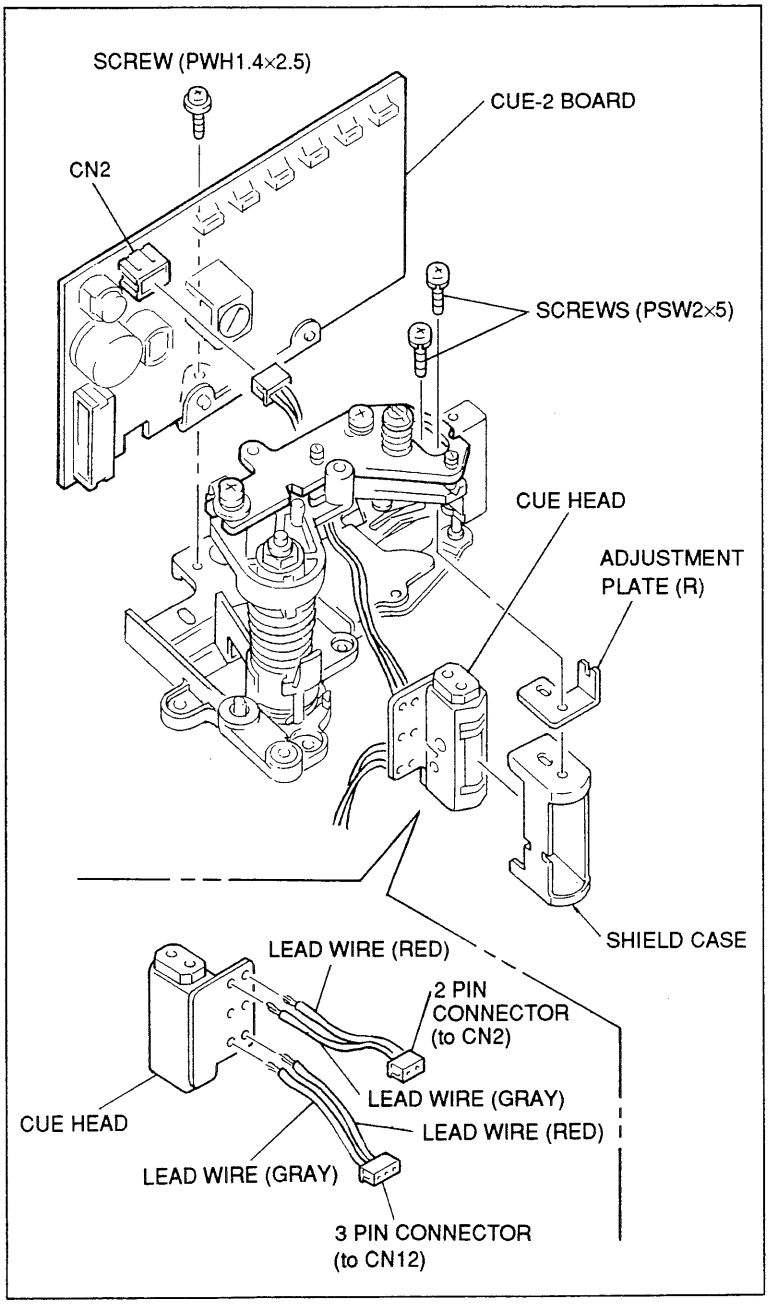
(4) Desolder the four leads from the printed circuit board of the CUE head, and re-solder them to the new CUE head.

Note
Never mistake the soldering positions.

(5) After putting the new CUE head in the shield case, assemble the parts in the sequence shown in the figure and tighten the two screws.
19×10^{-2} N•m (1.9 kgf•cm)

(6) Attach the CUE-2 board using the two screws.
9×10^{-2} N•m (0.9 kgf•cm)

(7) Connect the harness connector from the CUE head to the connector CN2 on the CUE-2 board.



6. CUE head block installation

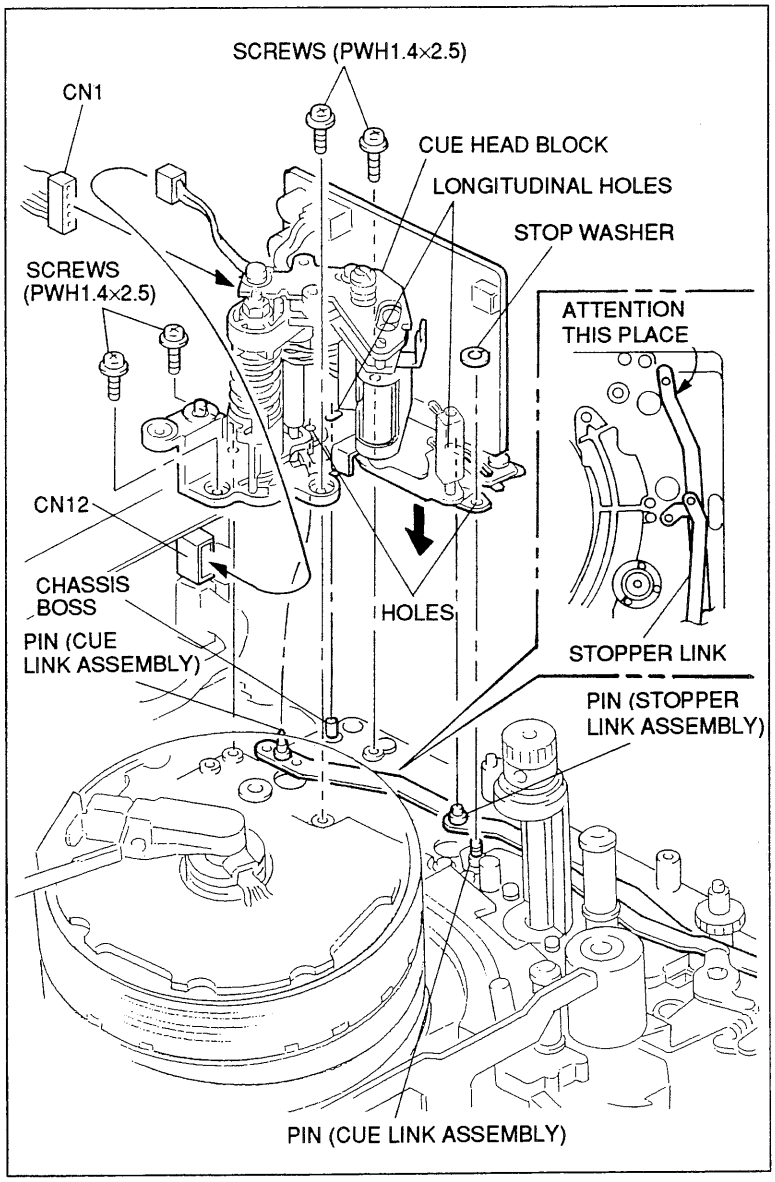
(1) Align the CUE link assembly with the position shown in the figure by hand.
Reference: In this way the following steps will easily carry out.

(2) Put the two pins of the CUE link assembly in the two holes of the CUE head block. Put the pins of the stopper link and chassis in the two longitudinal holes of the CUE head block.

(3) Attach the CUE head block to the chassis using the four screws.
9×10^{-2} N•m (0.9 kgf•cm)

(4) Attach the stop washer to the pin of the CUE link assembly.

(5) Connect the harness connectors to the connectors CN12 on the HN-189 board and CN1 on the CUE-2 board.



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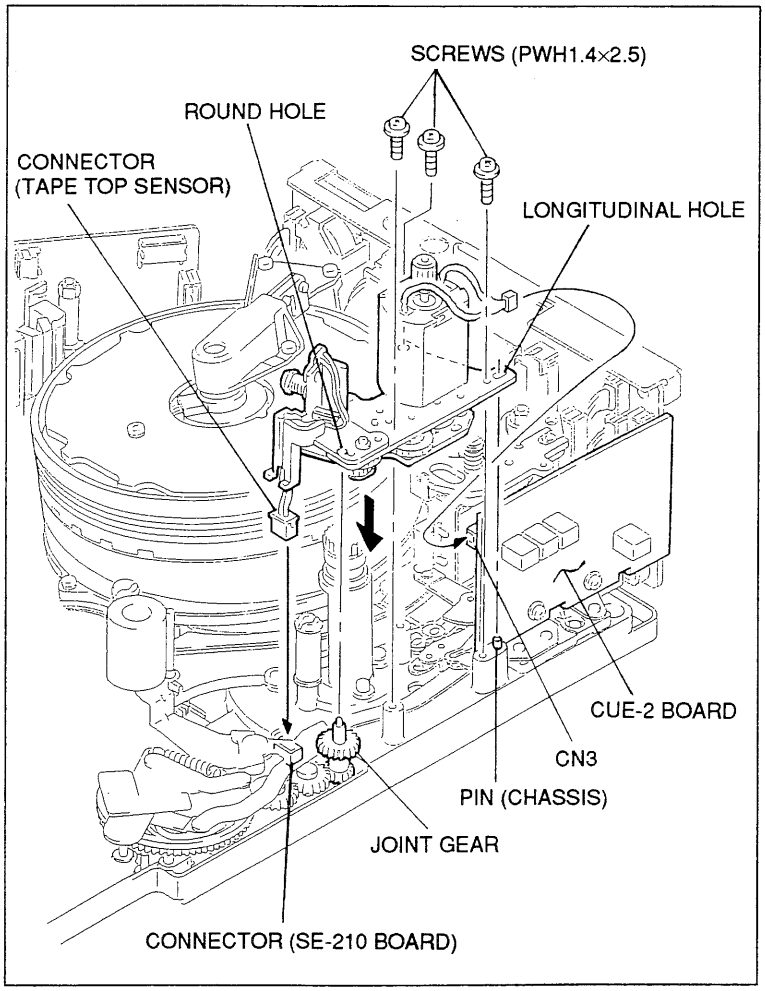
7. Gear block assembly installation

(1) While connecting the connector of the tape top sensor that connects to the gear block assembly to the connector on the SE-210 board which attaches to the chassis, put the pin of the chassis in the longitudinal hole of the gear block assembly and the top of the joint gear that attaches to the chassis in the round hole of the gear block assembly. Tighten the three screws.
9×10^{-2} N•m (0.9 kgf•cm)

Note
Check that the connector connects to the SE-210 board.

(2) Connect the harness connector to the connector CN3 on the CUE-2 board.
(3) Attach the VH cleaner assembly. (Refer to section 7-2-6.)
9×10^{-2} N•m (0.9 kgf•cm)



8. Cleaning of the head

(1) Clean the CUE head using a cleaning piece moistened with cleaning fluid.

Note
After cleaning, be sure to wipe using a dry cleaning cloth.

9. Cassette compartment installation

Attach the cassette compartment using the three screws. (Refer to section 1-6.)

10 Manual eject assembly installation
Attach the manual eject assembly.
(Refer to section 7-1-3.)
9×10^{-2} N•m (0.9 kgf•cm)

11. Operation check
When turning the manual eject gear clockwise and counterclockwise while pressing down it, check that the cleaning roller assembly moves and cleans the CUE head.

Adjustments after replacement

12. Tape running adjustment
(Refer to section 7-4-1.)

13. Video tracking adjustment
(Refer to section 7-4-2.)

14. CUE head height adjustment
(Refer to section 7-4-5.)

15. CTL head position adjustment
(Refer to section 7-4-4.)

16. CUE/TC head position adjustment
(Refer to section 7-4-8.)

17. Audio system adjustment
(Refer to section 5-3-2.)

7-3. MECHANICAL ADJUSTMENTS

7-3-1. Tension Regulator Operating Position Adjustment

Note

When replacing the S brake assembly or S reel table assembly, be sure to carry out tension regulator operating position adjustment.

Preparations

1. Check that the unit is in the unthreading end mode.
2. Remove the front lid and the outside panel. (Refer to section 1-5.)
3. Remove the cassette compartment. (Refer to section 1-6.)

Reference:The tension regulator operating position check can carry out when the cassette compartment attaches to the unit.

Tools

- Torque screwdriver bit (for M2) : J-6325-380-A
- Torque screwdriver (for 3 kg) : J-6325-400-A

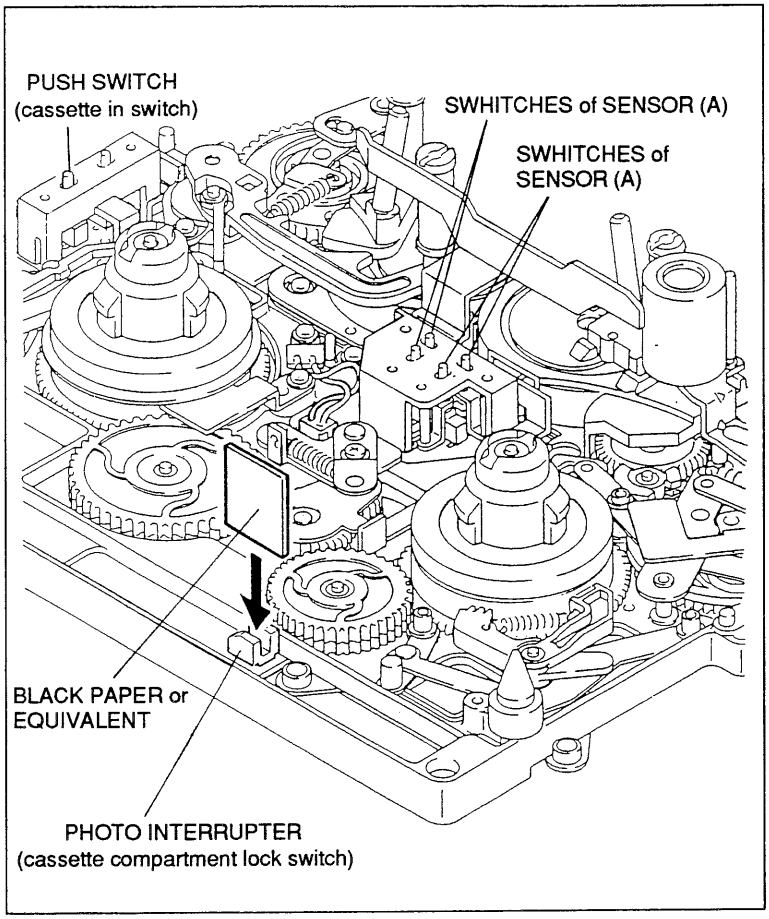
Check

1. Mode selection

(1) Turn the power on.

(2) Interrupt the photo interrupter (cassette compartment lock switch) mounted on the SE-210 board using a black paper or equivalent.

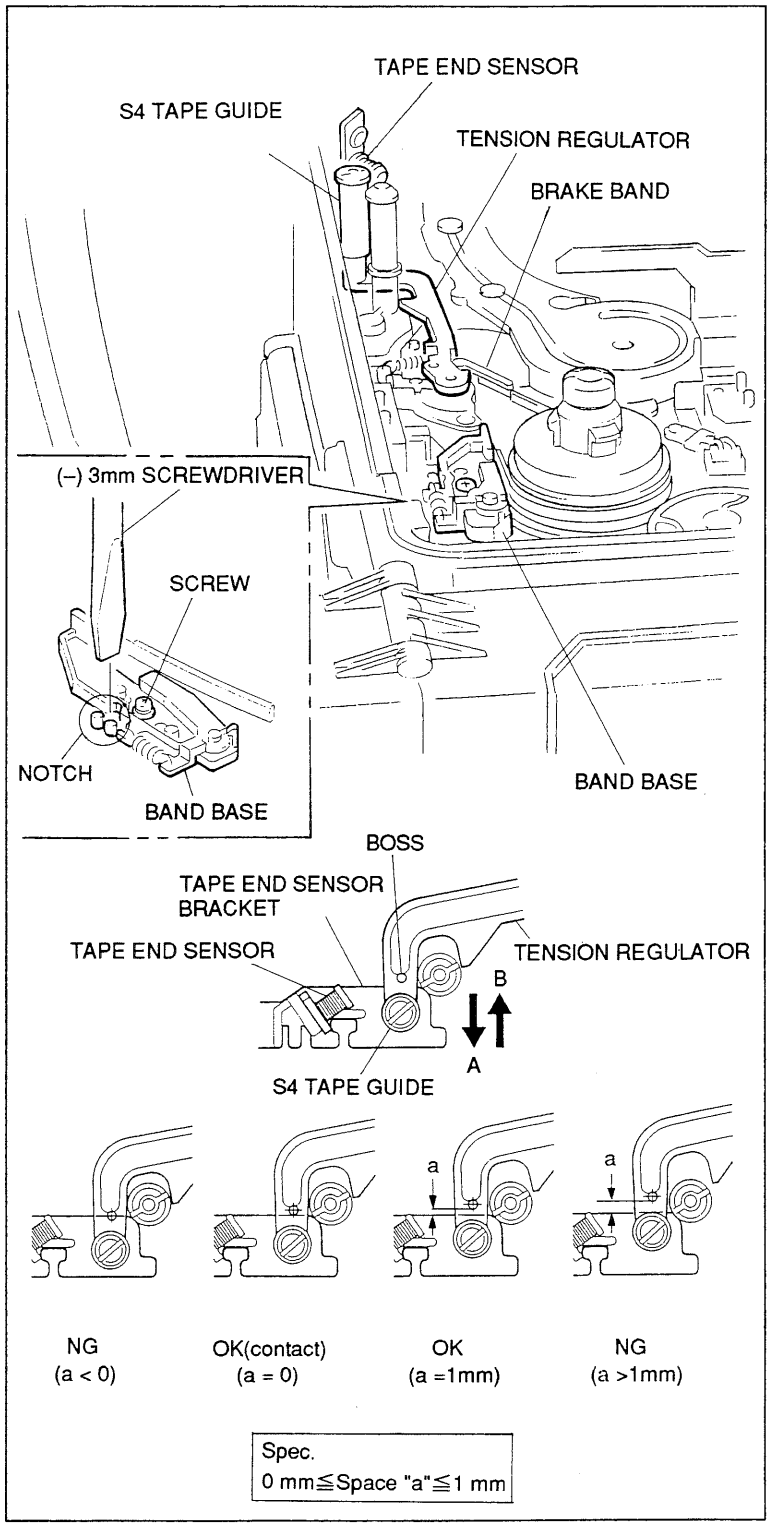
(3) While pressing the four switches of the sensor A, press the push switch (cassette in switch) mounted on the SE-275 board using finger. In this way the unit will be in the threading end mode without a cassette tape about 1 secound in this state.



2. Tension regulator operating position check

Check that the position of the boss on the tension regulator shown in the figure meets the specification.

If the specification does not meet, check that the position of the boss shifts to either direction A or B against the elongation line of the edge portion of tape end sensor bracket. After checking, carry out step 3.



Adjustment

3. Position adjustment

(1) Loosen the screw of the band base about 1/3 turn.

(2) Put the (–) 3 mm screwdriver in the notch shown in the figure and adjust the position of the band base so that meets the specification.

Point for adjustment

- If the tension regulator shifts to the direction A, turn the (–) 3 mm screwdriver clockwise.
- If the tension regulator shifts to the direction B, turn the (–) 3 mm screwdriver counterclockwise.

(3) While keeping the state of step the (2), tighten the screw of the band base.

EX 19×10^{-2} N•m (1.9 kgf•cm)

4. Mode cancel

Press the EJECT button and put the unit is in the unthreading end mode.

5. FWD back tension adjustment

Carry out the FWD back tension adjustment. (Refer to section 7-3-2.)

7-3-2. FWD Back Tension Adjustment

Note

When replacing the brake band assembly or S reel table assembly, or carrying out the tension regulator operating position adjustment, be sure to carry out FWD back tension adjustment.

Preparations

1. Check that the unit is in the unthreading end mode.
2. Remove the front lid and the outside panel. (Refer to section 1-5.)

Notes

For this adjustment, it is recommended to attach the cassette compartment to the unit.
If the cassette compartment does not attach to the unit, interrupt the photo interrupter (cassette compartment lock switch) mounted on the SE-275 board using a black paper or equivalent so that the unit is in the cassette lock state.
After placing a weight on a FWD back tension measuring cassette tape so as not to rise it up, carry out this adjustment.

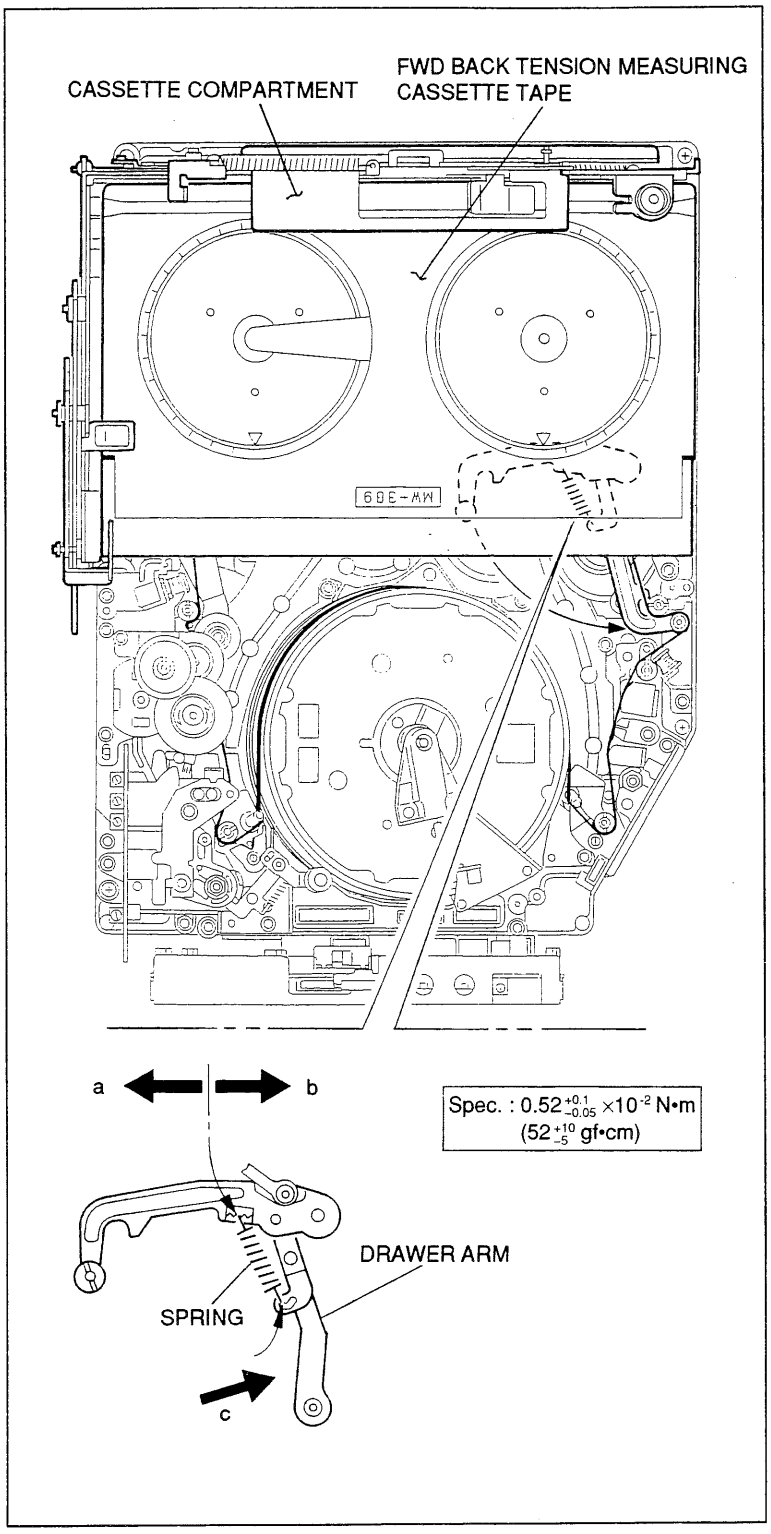
Tool

- FWD back tension measuring cassette tape : J-6323-890-A

Check

1. **REC mode setting**
   Insert a FWD back tension measuring cassette tape, and put into the recording mode.

2. **FWD back tension check**
   Check that the value of the FWD back tension measuring cassette tape at the S side meets the specification. If the specification does not meet, carry out step 3 and later after checking that the value is larger or smaller than the specification.



Adjustment

3. **EJECT mode setting**
   Eject the FWD back tension measuring cassette tape.

4. **Back tension adjustment**
   Change the position of the spring on the tension regulator arm block.

   Reference of adjustment
   - If the value is larger than the specification, move the position of the spring to the direction b.
   - If the value is smaller than the specification, move the position of the spring to the direction a.

5. **FWD back tension check after adjustment**
   Carry out the steps 1 and 2 and check that the value meets the specification.

   Note
   If the value does not meet the specification after carrying out the step 4, move the positon of the spring at the drawer arm side to the direction c. Re-carry out step 4 and re-adjust.

7-3-3. Brake Torque Check

Note

When replacing the T soft brake assembly or T reel table assembly, be sure to carry out brake torque check.

Preparations

1. Check that the unit is in the unthreading end mode.
2. Remove the front lid and the outside panel. (Refer to section 1-5.)

Tool

• FWD back tension measuring cassette tape : J-6323-890-A

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Check

1. Setting

(1) Insert the FWD back tension measuring cassette tape.
(2) Select the dip switch S1-1 on the HN-189 board to the ON. In this way the red LED will light up.
(3) Press the switch S3 on the HN-189 board 10 times. After pressing, check that the Nos. 1 and 3 of the MODE display LEDs light up.
(4) Press the REW button. In this way the unit puts into the REV × 1 mode.

2. T side brake torque check

Check that the value of the FWD back tension measuring cassette tape at the T side meets the specification.

In case that the value does not meet the specification

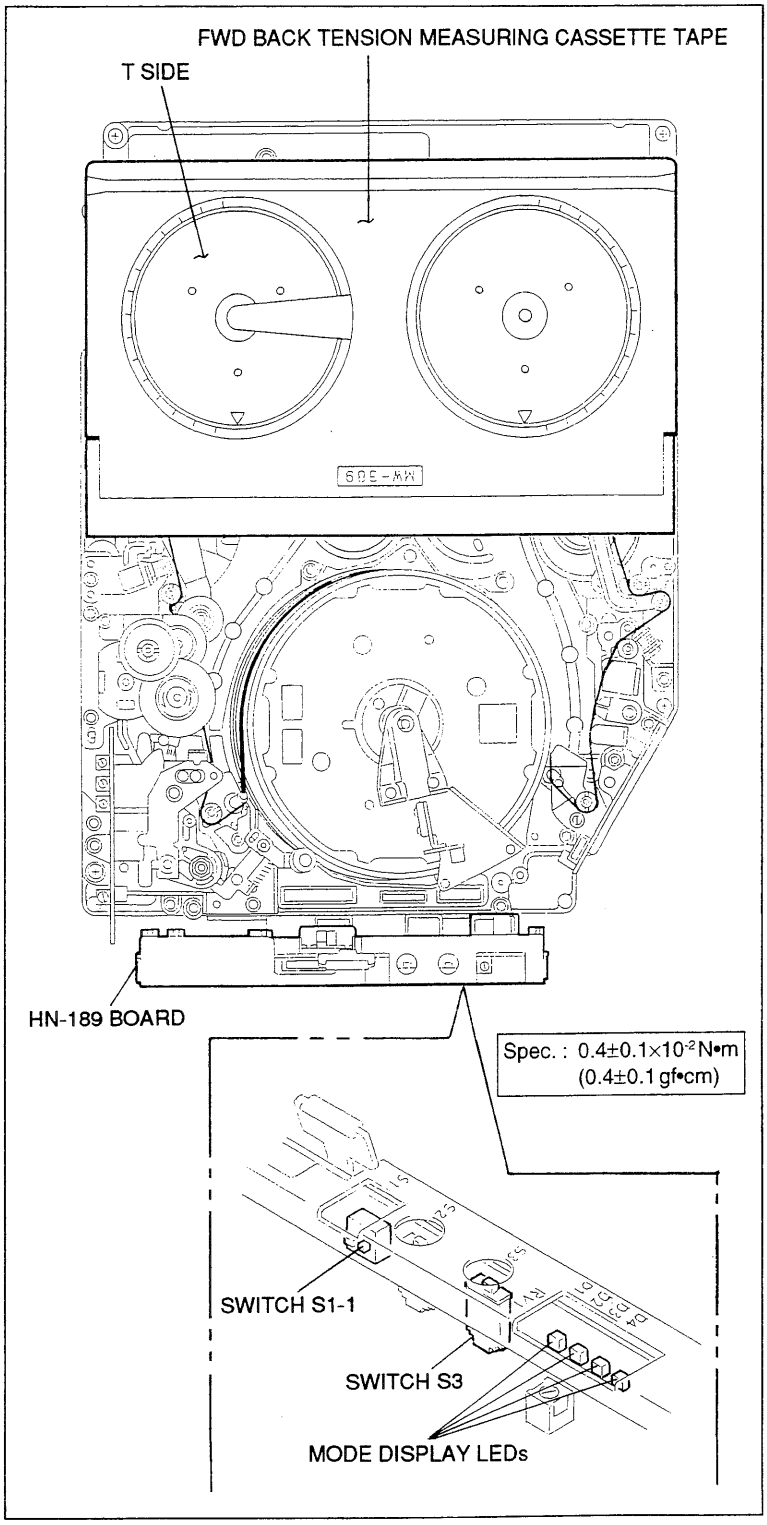
- Check that the T soft brake assembly properly attaches to the unit according to section 7-2-10.

Or

- Replace the T soft brake assembly according to section 7-2-10.

3. Adjustment mode cancel

(1) Put the unit into the STOP mode.
(2) Select the dip switch S1-1 on the HN-189 board to the OFF. Check that the red LED turns out.



7-3-4. Belt Tension Adjustment

Note

When replacing the swing gear assembly, capstan motor or timing belt, be sure to carry out belt tension adjustment.

Preparations

1. Check that the unit is in the unthreading end mode.
2. Remove the front lid and the outside panel. (Refer to section 1-5.)

Tools

- Torque screwdriver bit (for M1.4) : J-6325-110-A
- Torque screwdriver (for 3 kg) : J-6325-400-A

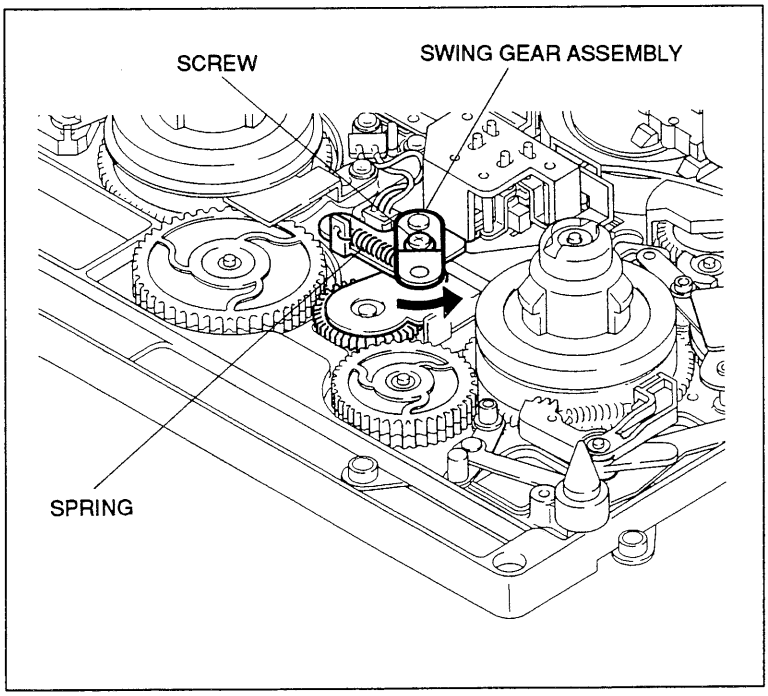
Adjustment

1. **Belt tension adjustment**
   (1) Check that the spring and its hook shown in the figure of the swing gear assembly are not deformed.

   Reference
   The belt tension automatically adjusts by this tension spring. Before this adjustment, check that the spring and its hook are not deformed. If the spring or its hook is deformed, replace it before this adjustment.

   (2) Loosen the screw shown in the figure 1 or 2 turn.
   (3) After pressing the swing gear arm in the direction of the arrow by finger, release it. The swing gear arm will automatically return to the correct position by the power of the spring.
   (4) Tighten the screw loosened in the step (2).
   EX 9×10^{-2} N•m (0.9 kgf•cm)

   Note
   When tightening the screw, never hold the swing gear assembly block by finger.

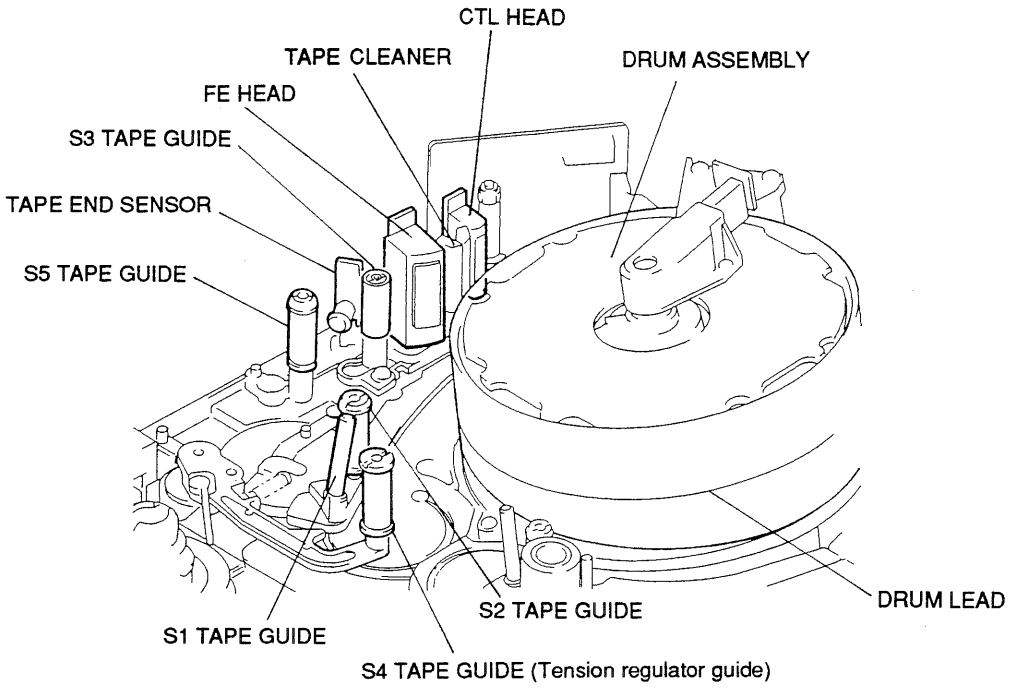


7-4. Tape Path Adjustment

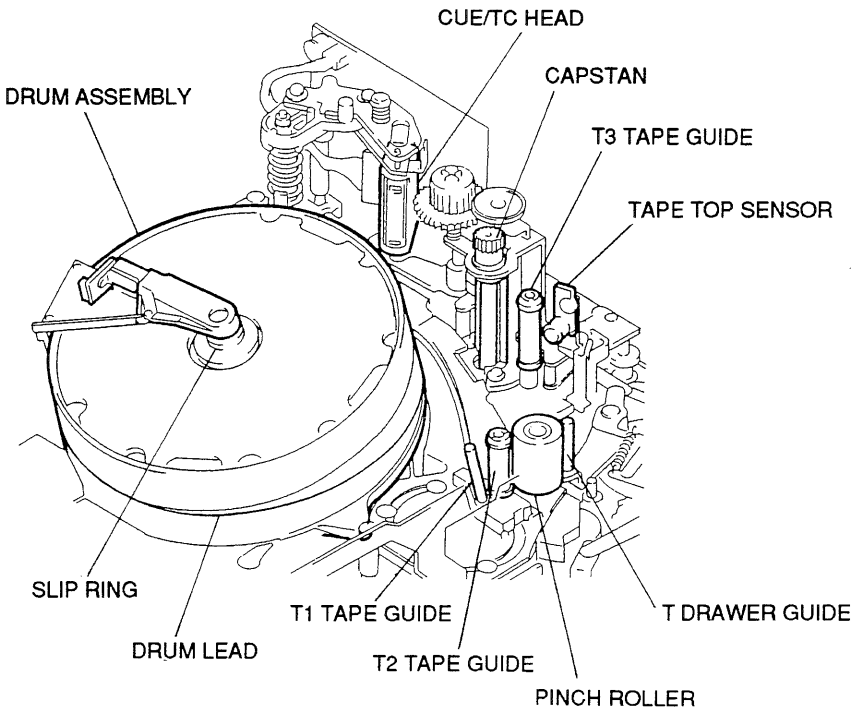
Index

1. Location of Tape Path System

DRUM ENTRANCE SIDE (UNTHREADING END MODE)



DRUM EXIT SIDE (UNTHREADING END MODE)



2. Note

• About cassette compartment
Carry out the tape path adjustment in the state that the cassette compartment attaches to the unit.

3. Preparations

(1) Turn the power off.
(2) Remove the front lid and the outside panel. (Refer to section 1-5.)
(3) Clean the following items using a cleaning cloth moistened with cleaning fluid.
- Video heads (Refer to section 6-1-2.)
- Tape running surface of the upper drum (Refer to section 6-1-2.)
- Tape running surface of the lower drum and the lead surface (Refer to section 6-1-3.)
- Stationary heads (Refer to section 6-1-4.)
- Tape cleaner (Refer to section 6-1-5.)
- All tape guides (Refer to section 6-1-5.)
- Capstan shaft (Refer to section 6-1-5.)
- Pinch roller (Refer to section 6-1-5.)

4. Tools

- Tape guide adjustment screwdriver : J-6321-500-A
- TP tool : J-6420-910-A
- Inspection mirror : J-6080-840-A
- Cleaning cloth : 3-184-527-01
- Cleaning fluid : 9-919-573-01
- Alignment tape, ZR2-1 (for NTSC) : 8-960-073-11
- Alignment tape, ZR2-1P (for PAL) : 8-960-073-61

Contents

TIME mim. sec.	CTL TRACK	CUE TRACK	VIDEO/AUDIO TRACK	USE
00:00 (7:3 PULSE) 15:00	CTL	1 kHz, 0 VU	4 MHz (A CH only)	• Video tracking adjustment • CTL head position adjustment • CUE head height adjustment • CUE/TC head position adjustment
20:00	CTL	12 kHz, 0 VU	A/C CH : 4 MHz B/D CH : 8 MHZ	• CUE/TC head azimuth adjustment • CUE/TC head head-to-tape contact adjustment
25:00	CTL	12 kHz, 0 VU	16 MHz (ALL CHANNEL)	
27:00	CTL	——	50% FLATFIELD (ALL CHANNEL)	

* The CTL head height adjustment can use at any portion of this alignment tape.

7-4-1. Tape Running Adjustment

Notes

- When carrying out the tape running adjustment after replacing the part of the tape path system, first carry out the checks and adjustments of the tape running using a Digital Betacam cassette tape BCT-D40. Next carry out the checks and fine adjustments of the tape running using an alignment tape ZR2-1/P.
- The following checks and adjustments describe in the state that the alignment tape ZR2-1/P uses.
- Tighten the screws at the top of the tape guides to the following tightening torque. 9×10^{-2} N•m (0.9 kgf•cm)
- After adjustment, be sure to check the video tracking adjustment. After checking, put a locking compound to the screws at the top of each tape guide.

Drum Entrance Side

Tools

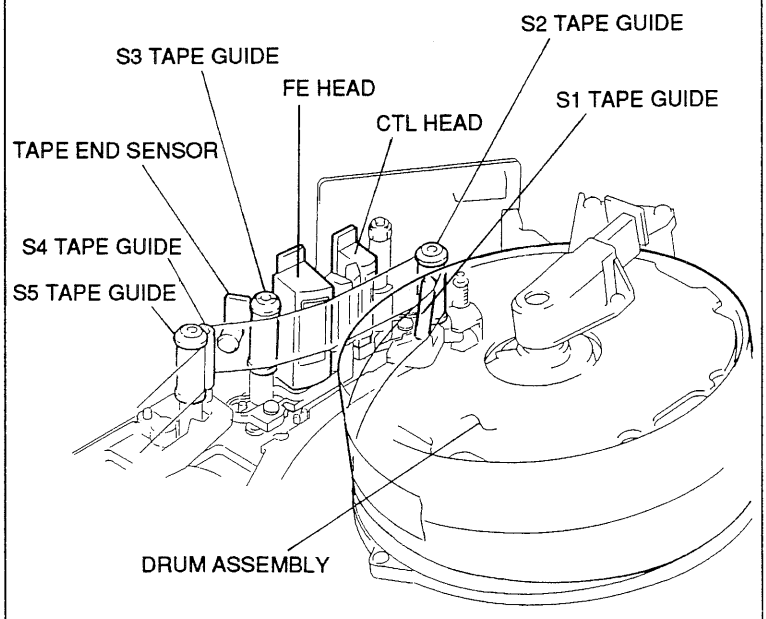
- Tape guide adjustment screwdriver (45) :J-6322-420-A
- Inspection mirror :J-6080-840-A
- Alignment tape, ZR2-1 (for NTSC) :8-960-073-11
- Alignment tape, ZR2-1P (for PAL) :8-960-073-61
- Cassette tape, BCT-D40 : Standard products

Checks

1. **Play mode (Beginning portion of the tape)**
   Put into the play back mode at the beginning portion of the ZR2-1/P (from 5:00 to 10:00). Check that the tape running condition meets specification 1. If the specification 1 does not meet, carry out step 8 and later.

   Specification 1:
   (A) S5 guide
   Tape runs in contact the upper or lower flange.
   Acceptable range of the tape curl is less than 1/10 or equal of the tape width.
   (B) Tension regulator guide
   Tape runs in contact with the upper flange.
   Acceptable range of the tape curl is less than 1/10 or equal of the tape width.
   (C) S2 guide
   Tape runs in contact with the upper flange.
   Acceptable range of the tape curl is less than 1/10 or equal of the tape width.
   (D) Drum lead
   Tape runs in contact with the drum lead and without any curl.

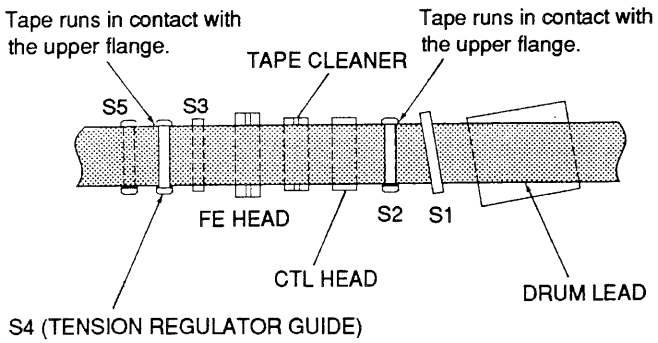
DRUM ENTRANCE SIDE (THREADING END MODE)

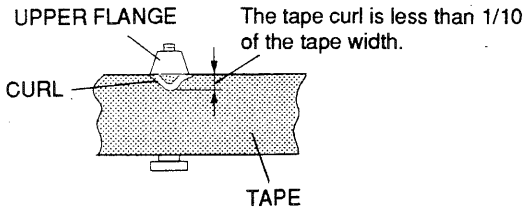


2. **F FWD mode (Beginning portion of the tape)**
   Put into the F FWD mode at the beginning portion of the ZR2-1/P (from 5:00 to 10:00). Check that the tape running condition meets the specification 2. If the specification 2 does not meet, carry out the step 8 and later.

3. **REW mode (Beginning portion of the tape)**
   Put into the REW mode at the beginning portion of the ZR2-1/P (from 5:00 to 10:00). Check that the tape running condition meets the specification 2. If the specification 2 does not meet, carry out the step 8 and later.

4. **PLAY mode (End portion of the tape)**
   Put into the PLAY mode at the end portion of the BCT-D40 (from 30:00 to 40:00). Check that the tape running condition meets the specification 1. If the specification 1 does not meet, carry out the step 8 and later.





Specification 1:

(A) S5 tape guide
Tape runs between the upper flange and the lower one.
If tape curl occurs by all means, less than 1/10 or equal of the tape width is acceptable.

(B) S4 tape guide (tension regulator guide)
Tape runs in contact with the upper flange.
If tape curl occurs by all means, less than 1/10 or equal of the tape width is acceptable.

(C) S2 tape guide
Tape runs in contact with the upper flange.
If tape curl occurs by all means, less than 1/10 or equal of the tape width is acceptable.

(D) Drum lead
Tape runs in contact with the drum lead without any curl.

5. **F FWD mode (End portion of the tape)**
   Put into the F FWD mode at the end portion of the BCT-D40 (from 30:00 to 40:00). Check that the tape running condition meets specification 2. If the specification 2 does not meet, carry out the step 8 and later.

6. **REW mode (End portion of the tape)**
   Put into the REW mode at the end portion of the BCT-D40 (from 30:00 to 40:00). Check that the tape running condition meets the specification 2. If the specification 2 does not meet, carry out the step 8 and later.

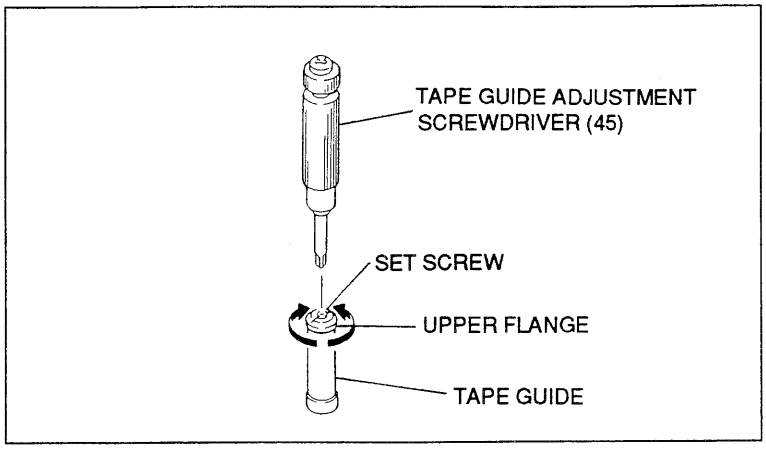
Specification 2:
(A) Upper flange of the S2 guide
Tape runs without any curl.
If tape curl occurs by all means, less than 1/10 or equal of the tape width is acceptable.
(B) Upper or lower flange of the tension regulator guide
Tape runs without any curl.
If tape curl occurs by all means, less than 1/10 or equal of the tape width is acceptable.
(C) Upper or lower flange of the S5 guide
Tape runs without any curl.
If tape curl occurs by all means, less than 1/10 or equal of the tape width is acceptable.
(D) Drum lead
Tape runs in contact with the drum lead and without any curl.

7. **Back space editing (Any portion of the tape)**
   Put into the REC mode and REC PAUSE mode at any portion of the BCT-D40. Check that the tape running condition meets the spacification 3.

Specification 3:
Tension regulator guide
Tape runs in contact with the upper flange.

Adjustments

8. S2 and S5 guides height adjustment
   (1) Put into the PLAY mode at the beginning portion of the ZR2-1/P (from 5:00 to 10:00).
   (2) Loosen the set screws at the top of the guides using the tape guide adjustment screwdriver (45). Turn the upper flanges of the guides, and adjust the heights of the guides so that meet the specifications 1 to 3.
   (3) Tighten the screws at the top of the guides.



9. **Tape running re-check at the drum entrance side**
   Carry out from the steps 1 to 7 of the check procedures, and re-check that the specifications meet. If the specifications do not meet, re-carry out the step 8.

10. **Tape running check at the drum exit side.**
    Check the tape running at the drum exit side on the following page and later.

Checks after adjustments

11. **Video tracking check**
    Refer to section 7-4-2.

12. **CTL head height check**
    Refer to section 7-4-3.

13. **CTL head position check**
    Refer to section 7-4-4.

14. **CUE/TC head position check**
    Refer to section 7-4-8.

Drum Exit Side

Checks

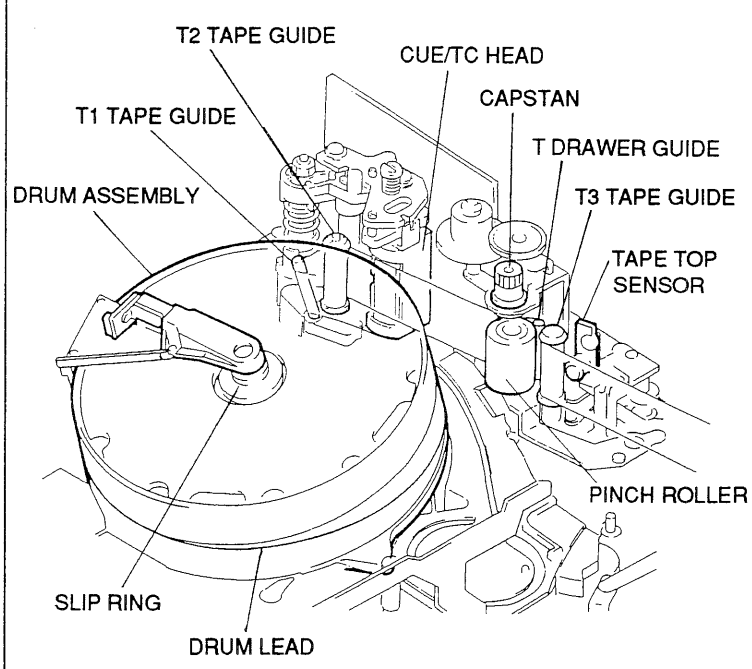
1. **Play mode (Beginning portion of the tape)**
   Put into the PLAY mode at the beginning portion of the ZR2-1/P (from 5:00 to 10:00).
   Check that the tape running condition meets specification 4.
   If the specification 4 does not meet, carry out step 8 and later.

2. **F FWD mode (Beginning portion of the tape)**
   Put into the F FWD mode at the beginning portion of the ZR2-1/P (from 5:00 to 10:00).
   Check that the tape running condition meets the specification 4.
   If the specification 4 does not meet, carry out the step 8 and later.

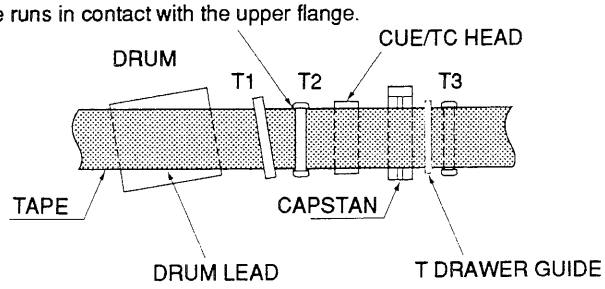
3. **REW mode (Beginning portion of the tape)**
   Put into the REW mode at the beginning portion of the ZR2-1/P (from 5:00 to 10:00).
   Check that the tape running condition meets the specification 5.
   If the specification 5 does not meet, carry out the step 8 and later.

4. **PLAY mode (End portion of the tape)**
   Put into the PLAY mode at the end portion of the BCT-D40 (from 30:00 to 40:00).
   Check that the tape running condition meets the specification 4.
   If the specification 4 does not meet, carry out the step 8 and later.

DRUM EXIT SIDE (THREADING END MODE)



Tape runs in contact with the upper flange.



Specification4:

(A) T2 guide
Tape runs in contact with the upper flange.
Acceptable range of the tape curl is less than 1/10 or equal of the tape width.

(B) T3 guide
Tape runs not in contact with upper and lower flanges.

(C) Drum lead
Tape runs in contact with the drum lead and without any curl.

5. **F FWD mode (End portion of the tape)**
   Put into the F FWD mode at the end portion of the BCT-D40 (from 30:00 to 40:00).
   Check that the tape running condition meets specification 4.
   If the specification 4 does not meet, carry out the step 8 and later.

6. **REW mode (End portion of the tape)**
   Put into the REW mode at the end portion of the BCT-D40 (from 30:00 to 40:00).
   Check that the tape running condition meets the specification 5.
   If the specification 5 does not meet, carry out the step 8 and later.

Specification 5:
(A) T2,T3 guide
Tape runs in contact with the upper flange.
If tape curl occurs by all means, tape curl is less than 1/10 or equal of the tape width is acceptable.
(B) Drum lead
Tape runs in contact with the drum lead and without any curl.

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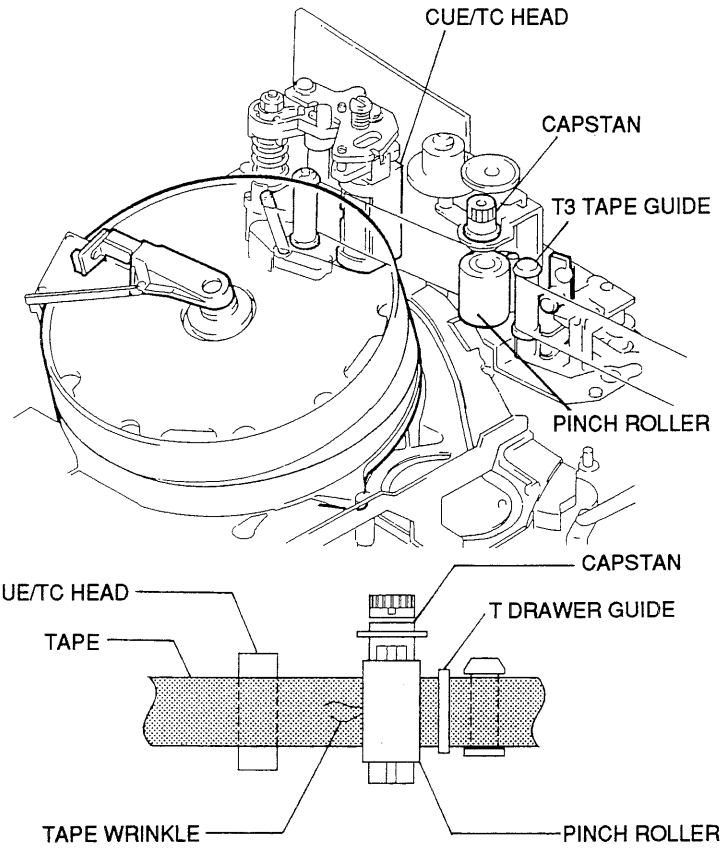
7. Tape running check around the capstan shaft

(1) Put into the REW mode at the end portion of the BCT-D40 (from30:00 to 40:00). After 2 or 3 seconds, put into the F FWD mode. When changing the mode, check that the tape running condition meets specification 6 between CUE head and capstan shaft. If the specification 6 does not meet, replace the pinch arm assembly.

(2) Repeat the step (1) 2 or 3 times and re-check.

(3) Put into the F FWD mode, and after 2 or 3 seconds put into the REW mode. When changing the mode, check that the tape running condition meets the specification 6 between CUE head and capstan shaft. If the specification 6 does not meet, replace the pinch arm assembly.



Specification 6:
Tape runs without any wrinkle.
If the tape wrinkle occurs, check that the tape wrinkle disappears within 2 seconds and do not damage the tape.

8. T2 and T3 guides height adjustment

(1) Put into the PLAY mode at the beginning portion of the ZR2-1/P (from 5:00 to 10:00).

(2) Loosen the set screws at the top of the guides using the tape guide adjustment screwdriver (45). Turn the upper flanges of the guides, and adjust the heights of the guides so that meet the specifications 4 and 5.

(3) Tighten the set screws at the top of the guides.

10. Tape running re-check at the drum exit side

Carry out the steps 1 to 7 of the check procedures, re-check that the specifications meet.

If the specifications do not meet, re-carry out the adjustment of the step 8.

11. Tape running re-check at the drum entrance side

Re-check the tape running adjustment at the drum entrance side.

Checks and adjustments after this adjustment

12. Video tracking adjustment

Refer to section 7-4-2.

13. CUE head height check

Refer to section 7-4-5.

14. CUE head azimuth adjustment

Refer to section 7-4-6.

15. CUE head height adjustment

Refer to section 7-4-5.

16. CTL head position check

Refer to section 7-4-4.

17. CUE/TC head position check

Refer to section 7-4-8.

7-4-2. Video Tracking Adjustment

Notes

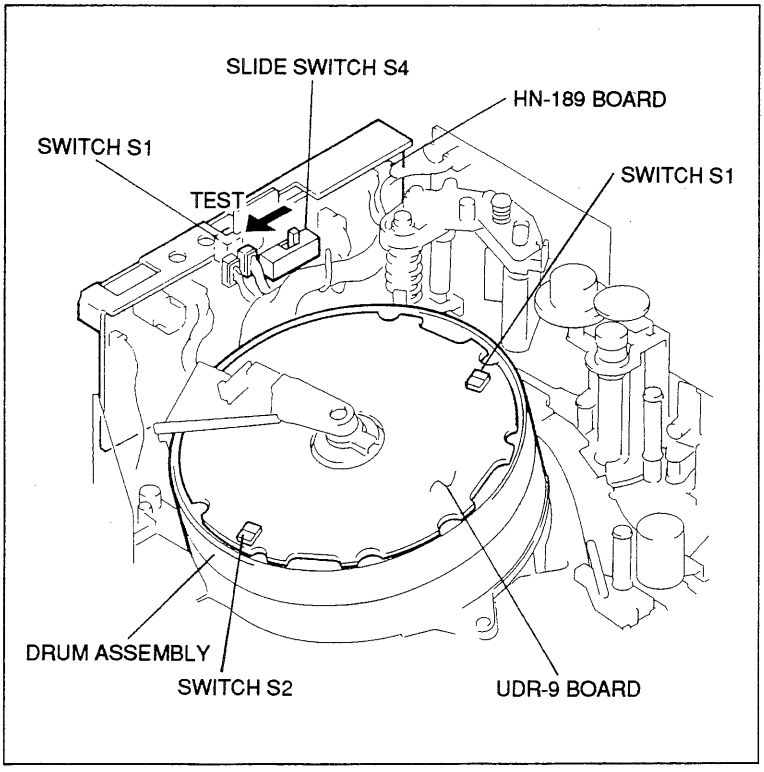
- Tighten the screws at the top of the tape guides to the following tightening torque.
  9×10^{-2}N•m (0.9 kgf•cm)
- After this adjustment, be sure to check the tape running adjustment.
  After checking, put a locking compound to the screws at the top of each tape guide.

Tools

- Tape guide adjustment screwdriver (45) : J-6322-420-A
- Inspection mirror : J-6080-840-A
- TP tool : J-6420-910-A
- Alignment tape, ZR2-1 (NTSC) : 8-960-073-11
- Alignment tape, ZR2-1P (PAL) : 8-960-073-61
- Oscilloscope

Preparations

1. Turn the power off.
2. Connect the 8pin connector of the TP tool to the connector CN7 on the HN-189 board.
3. Connect the 5pin connector of the TP tool to the connector CN3 on the CTL-10 board.
4. Select the all four switches of switches S1 and S2 on the UDR-9 board which attaches to the upper drum to the TEST (ON).
5. Select the switch S4 on the HN-189 board to the TEST.
6. Disconnect the connector that connects to the slip ring and connect the connector of the harness side to the connector CN9 on the HN-189 board
7. Select the switches S1-1 and S1-2 on the HN-189 board to the OFF.
8. Connect an oscilloscope.
   CH-1 : REC RF A/TP tool
   CH-2 : REC RF E/TP tool
   TRIG : SV REF CF/TP tool
9. Turn the power on.
10. Insert the alignment tape ZR2-1/P.



Checks

1. PLAY mode

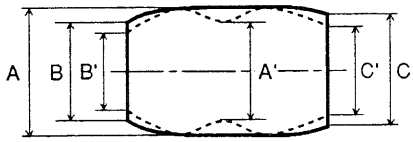
(1) Select the switch S1-2 on the HN-189 board to the ON. This way tracking volume can operate.

(2) Play back the ZR2-1/P (from 00:00 to 15:00).

(3) When turning the tracking volume (RV1) on the HN-189 board, check that the levels of entrance and exit sides are smaller than the output level at the center.
If the levels are bigger than, carry out step 5 and later (drum at entrance side or drum at exit side).

(4) Turn the tracking volume (RV1) and check that the RF waveform is 80% of the maximum output level. Check that the RF waveform meets specification 1.
If the specification 1 does not meet, carry out step 3 and later (drum at entrance side or drum at exit side).

<PLAY MODE>



SPEC1.: $\frac{B}{A} \times 100 \geqq 80\%$ (Drum at entrance side)

$\frac{C}{A} \times 100 \geqq 80\%$ (Drum at exit side)

$\frac{B'}{B} \times 100 \geqq 90\%$ (Fluctuation at drum entrance side)

$\frac{C'}{C} \times 100 \geqq 90\%$ (Fluctuation at drum exit side)

$\frac{A'}{A} \times 100 \geqq 90\%$ (Fluctuation at drum center)

2. RF waveform check

(1) When the unit moves from horizontal position to vertical it, the RF waveform meets the specification 1.
If the specification 1 does not meet, carry out the step 3 and later (drum at entrance side or drum at exit side).

(2) When the unit returns the horizontal position and repeat the mode change from the EJECT mode to PLAY mode 2 or 3 times, check that the RF waveform during PLAY mode is the same as the pre-PLAY mode, does not change and meets the specification 1. If the RF waveform changes or the specification 1 does not meet, carry out the step 3 and later (drum at entrance side or drum at exit side).

(3) When repeat the mode change from the REV search mode to PLAY mode 2 or 3 times, check that the RF waveform during PLAY mode is the same as the pre-PLAY mode, does not change and meets the specification 1. If the RF waveform changes or the specification 1 does not meet, carry out the step 3 and later (drum at entrance side or drum at exit side).

REV search mode

- Press the REW button after pressing the PLAY mode.
  (The PLAY and REW buttons on the keyboard light up.)

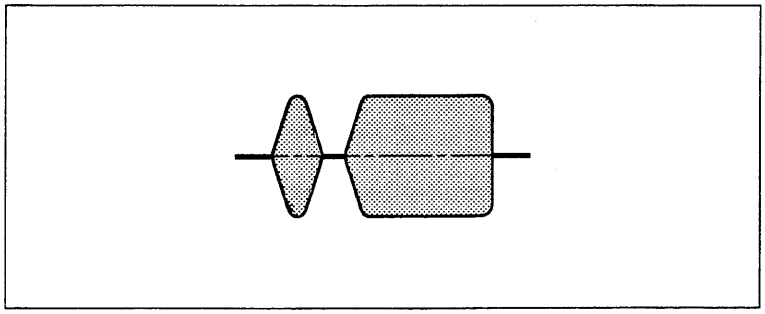
(4) When repeat the mode change from the STOP mode to PLAY mode 2 or 3 times, check that the RF waveform during PLAY mode is the same as the pre-PLAY mode, does not change and meets the specification 1. If the RF waveform changes or the specification does not meet, carry out the step 3 and later (drum at entrance side or drum at exit side).

Adjustments

Drum at entrance side

3. Tracking adjustment of drum at entrance side

(1) Play back the ZR2-1/P (from 00:00 to 15:00).
(2) Loosen the set screw at the top of the S2 guide using the tape guide adjustment screwdriver.
(3) Turn the upper flange of the S2 guide counterclockwise using the tape guide adjustment screwdriver so that the 1.5 peaks occur as show in the figure.
Check that the clearance is exist between lower flanges of the tension regulator and S5 guides and lower edge of the tape.
If no clearance is exist, adjust the height of the tension regulator and S5 guides.
(4) Check that the no clearance is exist between upper flange of the S2 guide and upper edge of the tape.
(5) Turn the upper flange of the S2 guide clockwise so that the RF waveform makes almost flat.
(6) Select the switch S1-2 on the HN-189 board to the ON. This way the tracking volume can operate.
(7) Play back the ZR2-1/P (from 00:00 to 15:00).
(8) Turn the tracking volume so that the RF waveform is 80% of the maximum output level.
(9) Turn the upper flange of the S2 guide and fine-adjust the height of the S2 guide so that the RF waveform is flat and meets the specification 1.
(10) Turn the upper flange of the S2 guide counterclockwise so that the RF waveform is 3 to 5 % down from flat.
(11) Tighten the set screw at the top of the S2 guide.

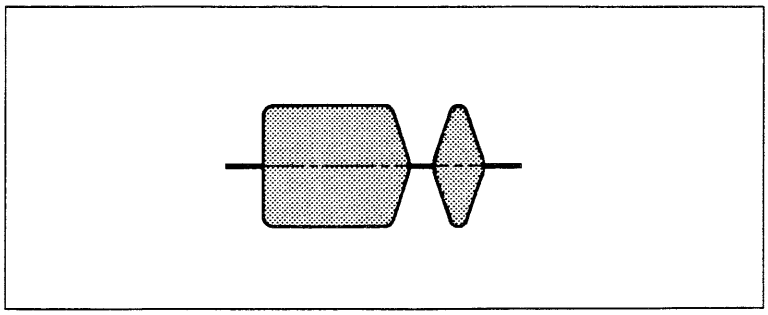


(12) Loosen the set screw at the upper flange of the S5 guide. Turn and adjust the upper flange so that the tape runs in contact with the upper flange.
(13) Tighten the set screw at the top of the S5 guide.

4. Video tracking re-check
Carry out the steps 1 and 2 of the check procedures and re-check the video tracking.

5. Tape running check
Check the tape running condition (drum at entrance side) according to section 7-4-1.

Note
After adjustment, be sure to select the switch S1-2 on the HN-189 board to the OFF.



Drum at exit side

6. Tracking adjustment at drum exit side
(1) Play back the ZR2-1/P (from 00:00 to 15:00).
(2) Loosen the set screw at the top of the T2 guide using the tape guide adjustment screwdriver.
(3) Turn the upper flange of the T2 guide counterclockwise using the tape guide adjustment screwdriver so that the 1.5 peaks occur. Check that the clearance is exist between lower flange of the T3 guide and lower edge of the tape. If no clearance is exist, adjust the height of the T3 guide.
(4) Check that the no clearance is exist between upper flange of the T2 guide and upper edge of the tape.
(5) Turn the upper flange of the T2 guide clockwise so that the RF waveform makes almost flat.
(6) Select the switch S1-2 on the HN-189 board of the ON. This way the tracking volume can operate.
(7) Play back the ZR2-1/P (from 00:00 to 15:00).
(8) Turn the tracking volume so that the RF waveform is 80% of the maximum output level.
(9) Turn the upper flange of the T2 guide and fine-adjust the height of the T2 guide so that the RF waveform is flat and meets the specification 1.
(10) Tighten the set screw at the top of the T2 guide.
(11) Loosen the set screw at the upper flange of the T3 guide. Turn and adjust the upper flange so that the tape runs not in contact with the upper and lower flanges.
(12) Tighten the set screw at the top of the T3 guide.

7. **Video tracking re-check**
   Carry out the steps 1 and 2 of the check procedures and re-check the video tracking.

8. **Tape running check**
   Check the tape running condition (drum at exit side) according to section 7-4-1.

   Note
   After adjustment, be sure to select the switch S1-2 on the HN-189 board to the OFF.

Checks and adjustments after this adjustment

9. **CTL head height adjustment**
   Refer to section 7-4-3.

10. **CUE head height check**
    Refer to section 7-4-5.

11. **CUE head azimuth adjustment**
    Refer to section 7-4-6.

12. **CUE head height check**
    Refer to section 7-4-5.

13. **CTL head position adjustment**
    Refer to section 7-4-4.

14. **CUE/TC head position adjustment**
    Refer to section 7-4-8.

15. **Automatic servo adjustment**
    Refer to section 5-3-1.

7-4-3. CTL Head Height Adjustment

Tools

- TP tool : J-6420-910-A
- Alignment tape, ZR2-1 (NTSC) : 8-960-073-11
- Alignment tape, ZR2-1P (PAL) : 8-960-073-61
- Box screwdriver
- Oscilloscope

Setting

1. Turn the power on.
2. Connect the 8pin connector of the TP tool to the connector CN7 on the HN-189 board.
3. Connect the 5pin connector of the TP tool to the connector CN3 on the CTL-10 board.
4. Select the switches S1-1 and S1-2 on the HN-189 board to the OFF.
5. Connect an oscilloscope.
   CH-1: PB CTL/TP tool
   TRIG: SV REF CF/TP tool
6. Turn the power on.
7. Insert the alignment tape ZR2-1/P.

Checks

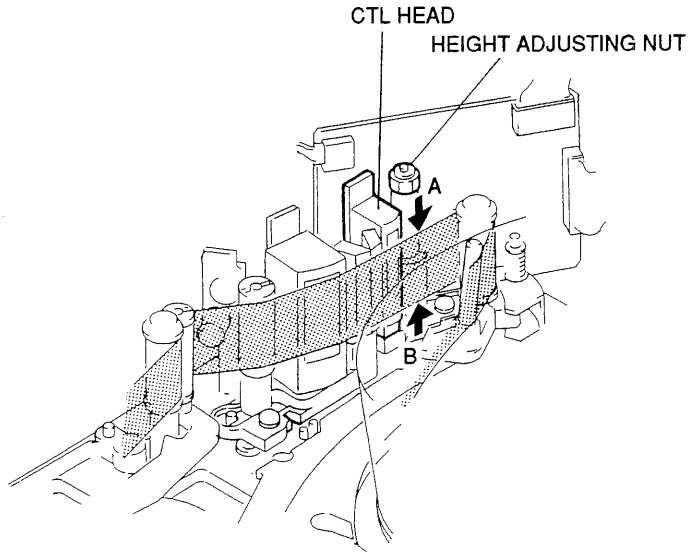
1. **Play back**
   Play back the ZR2-1/P.

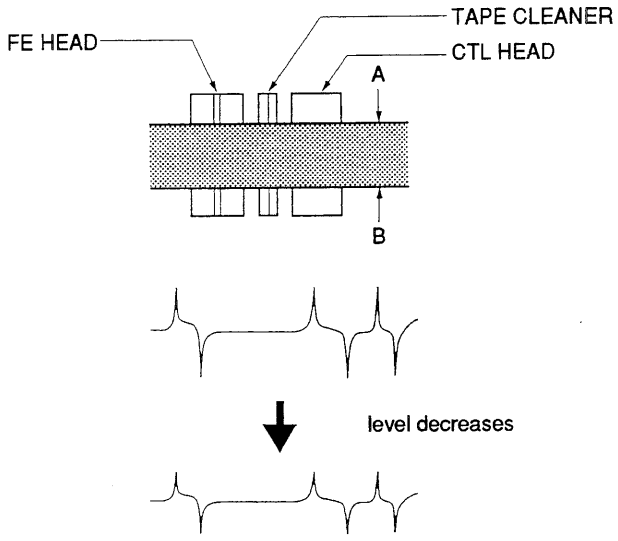
2. **CTL head height check**
   (1) When pressing down the portion A of the tape shown in the figure, check that the level decreases.
   If the level increases, carry out step 3.
   (2) When pushing up the portion B, check that the level decreases. If the level increases, carry out step 4.

Adjustments

3. **If the level increases when pressing down the tape**
   Turn the height adjusting nut counterclockwise, and adjust so that the output waveform is the maximum.

4. **If the level increases when pushing up the tape**
   Turn the height adjusting nut clockwise, and adjust so that the output waveform is the maximum.





Spec.: The level decreases when pressing down and pushing up the alignment tape.

Adjustments after this adjustment

5. **CTL head position adjustment**
   (Refer to section 7-4-4.)

6. **CUE/TC head position adjustment**
   (Refer to section 7-4-8.)

7. **Automatic servo adjustment**
   (Refer to section 5-3-1.)

7-4-4. CTL Head Position Adjustment

Notes

- The CTL head position adjustment is closely related to the CUE/TC head position adjustment.
- After carrying out the CTL head position adjustment, be sure to carry out the CUE/TC head position check.

Tools

- TP tool : J-6420-910-A
- Alignment tape, ZR2-1 (NTSC) : 8-960-073-11
- Alignment tape, ZR2-1P (PAL) : 8-960-073-61
- Torque screwdriver bit (for M2) : J-6325-380-A
- Torque screwdriver (for 3 kg) : J-6325-400-A
- Oscilloscope

Setting

1. Turn the power off.
2. Connect the 8pin connector of the TP tool to the connector CN7 on the HN-189 board.
3. Connect the 5pin connector of the TP tool to the connector CN3 on the CTL-10 board.
4. Select the switches S1-1 and S1-2 on the HN-189 board to the OFF.
5. Connect an oscilloscope.
   CH-1 : REC A RF/TP tool
   CH-2 : SHAPED CTL/TP tool
   TRG : SV REF CF/TP tool
6. Turn the power on.
7. Insert the alignment tape ZR2-1/P.

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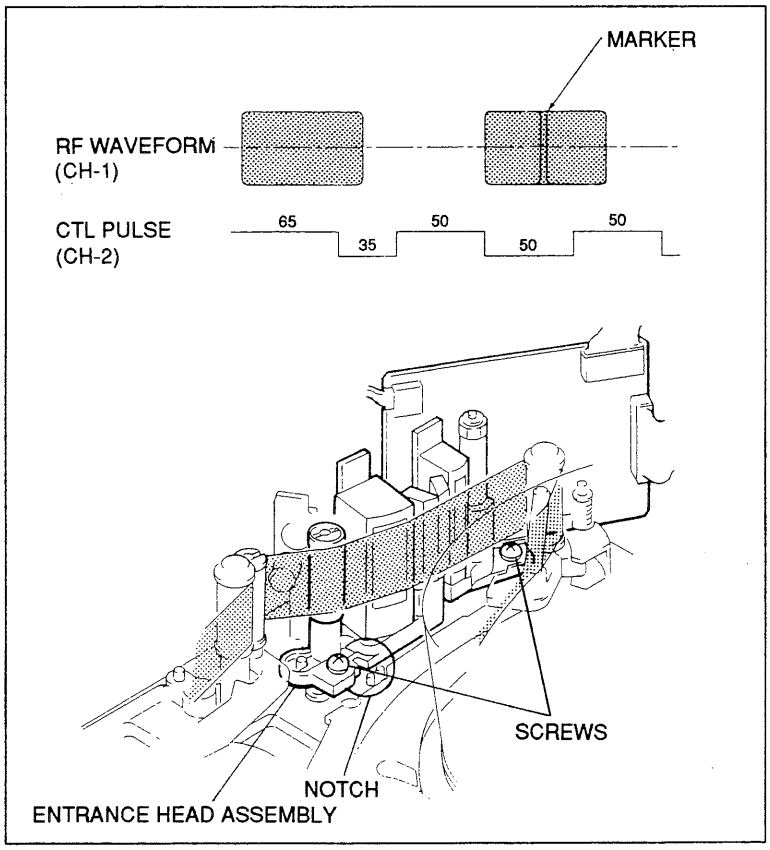
Checks

1. **Play back**
   Play back the ZR2-1/P (from 00:00 to 15:00).

2. **CTL head position check**
   (1) Select the switch 1-2 on the HN-189 board to the ON.
   This way the tracking volume can operate.
   (2) Turn the tracking volume (RV1) on the HN-189 board so that the output level at the center of the RF waveform is the maximum. Check that the marker of the RF waveform is output during the low level of the CTL PULSE.
   (3) Select the switch S1-2 on the HN-189 board to the OFF and put the tracking volume into the FIX state.
   (4) Check that the output level of the RF waveform with the marker does not change and is same as the level of the step (2).

   If the specification does not meet, carry out step 3.



Adjustments

3. **CTL head position adjustment**
   (1) Turn the two screws which secure the entrance head assembly 1/4 to 1/2 turn.
   (2) Put the (–) 3 mm screwdriver in the notch of the entrance head assembly.
   (3) Turn the screwdriver and adjust the CTL head position so that the marker of the RF waveform is output during the low level of the CTL PULSE, and the output level at the center of the RF waveform is the maximum.
   (4) While holding the screwdriver in the step (3), tighten the two screws.
   EP 19×10^{-2} N•m (1.9 kgf•cm)

4. **CTL head position re-check**
   Re-check the CTL head position according to steps 1 and 2.

Adjustment after this adjustment

5. **CUE/TC head position adjustment**
   (Refer to section 7-4-8.)

7-4-5. CUE Head Height Adjustment

Notes

- The CUE head height adjustment is closely related to the azimuth, zenith and position adjustments of the CUE head.
- After carrying out the CUE head height adjustment, be sure to carry out the other adjustments or checks of the CUE head.

Tools

- TP tool : J-6420-910-A
- Alignment tape, ZR2-1 (NTSC) : 8-960-073-11
- Alignment tape, ZR2-1P (PAL) : 8-960-073-61
- Box screwdriver
- Oscilloscope

Setting

1. Turn the power off.
2. Connect the 8pin connector of the TP tool to the connector CN7 on the HN-189 board.
3. Connect the 5pin connector of the TP tool to the connector CN3 on the CTL-10 board.
4. Select the switches S1-1 and S1-2 on the HN-189 board to the OFF.
5. Connect an oscilloscope.
   CH-1: PB CUE/TP tool
6. Turn the power on.
7. Insert the alignment tape ZR2-1/P.

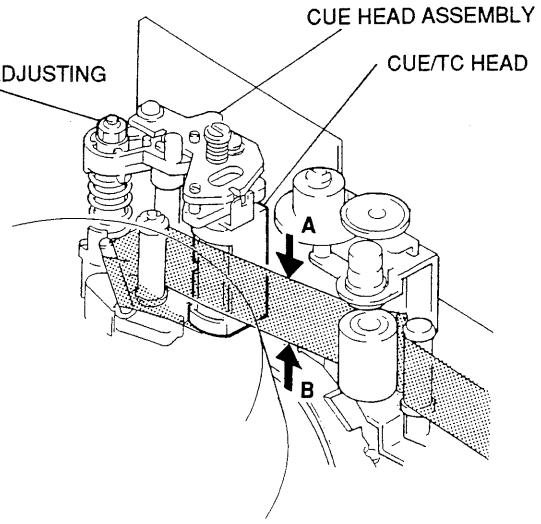
Checks

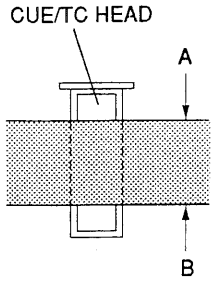
1. **Play back**
   Play back the ZR2-1/P (from 00:00 to 15:00).

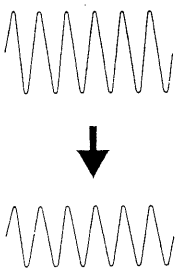
2. **CUE head height check**
   (1) When pressing down the portion A of the tape shown in the figure, check that the level decreases. If the level increases, carry out step 3.
   (2) When pushing up the portion B, check that the level decreases. If the level increases, carry out the step 3.
   (3) Repeat the mode change from EJECT mode to PLAY mode 2 or 3 times. Check that the output level is same as the pre-PLAY level and does not change.
   If the level changes, carry out the step 3.
   (4) Repeat the mode change from REV search mode to PLAY mode 2 or 3 time. Check that the output level is same as the pre-PLAY level and does not change.
   If the level changes, carry out the step 3.

REV search mode

- Press the REW button after pressing the PLAY button. (The PLAY and REW buttons on the keyboard light up.)







Spec.: The level decreases when pressing down and pushing up the alignment tape.

Adjustment

3. **CUE head height adjustments**
   - If the level increases when pressing down the tape, turn the height adjusting nut counterclockwise and adjust so that the output waveform is the maximum.
   - If the level increases when pushing up the tape, turn the height adjusting nut clockwise and adjust so that the output waveform is the maximum.

Checks and adjustments after this adjustment

4. **CUE head azimuth adjustment**
   Refer to section 7-4-6.

5. **CUE head head-to-contact check**
   Refer to section 7-4-7.

6. **CUE/TC head position adjustment**
   Refer to section 7-4-8.

7. **CUE head height check**
   Re-check according to the step 2.

7-4-6. CUE Head Azimuth Adjustment

Notes

- The check whether the CUE head azimuth correctly adjusted or not is extremely difficult from the point of the tape running system. The check does not carry out, but the adjustment carry out according to the following procedures.
- The CUE head azimuth check is closely related to the position and height adjustments of the CUE head.
- After carrying out the CUE head azimuth adjustment, be sure to carry out the adjustment or checks of the CUE head.

Tools

- Alignment tape, ZR2-1 (NTSC) : 8-960-073-11
- Alignment tape, ZR2-1P (PAL) : 8-960-073-61
- TP tool : J-6420-910-A
- Oscilloscope

Setting

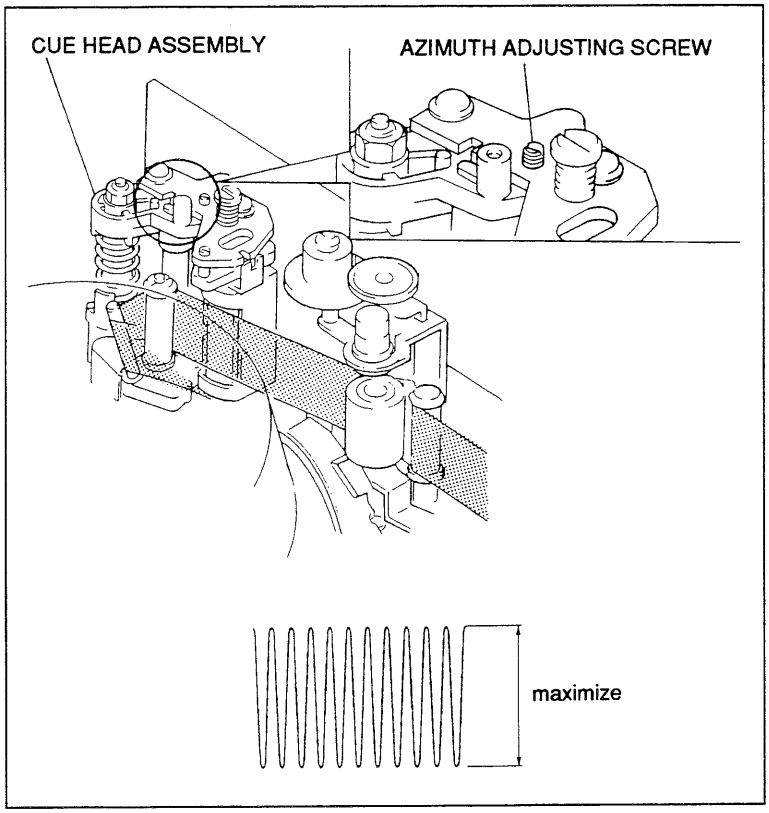
1. Turn the power off.
2. Connect the 8pin connector of the TP tool to the connector CN7 on the HN-189 board.
3. Connect the 5pin connector of the TP tool to the connector CN3 on the CTL-10 board.
4. Select the switches S1-1 and S1-2 on the HN-189 board to the OFF.
5. Connect an oscilloscope.
   CH-1: PB CUE/TP tool
6. Turn the power on.
7. Insert the alignment tape ZR2-1/P.

Adjustments

1. **Play back**
   Play back the ZR2-1/P (from 15:00 to 25:00).

2. **CUE head azimuth check**
   (1) Turn the azimuth adjusting screw clockwise or counterclockwise so that the output waveform is the maximum.
   (2) Repeat the mode change from the EJECT mode to PLAY mode 2 or 3 times. Check that the output level is the same as the level in the step (1) and does not change.
   (3) Repeat the mode change from the REV mode to PLAY mode 2 or 3 times. Check that the output level is the same as the level in the step (1) and does not change.

   REV search mode
   • Press the REW button after pressing the PLAY button.
   (The PLAY and REW buttons on the keyboard light up.)



3. **CUE head head-to-tape contact adjustment**
   (Refer to section 7-4-7.)

4. **CUE head height check**
   (Refer to section 7-4-5.)

5. **CUE/TC head position check**
   (Refer to section 7-4-8.)

7-4-7. CUE Head Head-to-tape Contact Adjustment

Notes

- The CUE head head-to-tape contact adjustment is closely related to the height, azimuth and position adjustments of the CUE head.
- After carry out the CUE head head-to-tape contact adjustment, be sure to carry out the adjustments or checks of the CUE head.

Tools

- Alignment tape, ZR2-1 (NTSC) : 8-960-073-11
- Alignment tape, ZR2-1P (PAL) : 8-960-073-61
- Torque screwdriver bit (for M2) : J-6325-380-A
- Torque screwdriver (for 3 kg) : J-6325-400-A
- TP tool : J-6420-910-A
- Oscilloscope

Setting

1. Turn the power off.
2. Connect the 8pin connector of the TP tool to the connector CN7 on the HN-189 board.
3. Connect the 5pin connector of the TP tool to the connector CN3 on the CTL-10 board.
4. Select the switches S1-1 and S1-2 on the HN-189 board to the OFF.
5. Connect an oscilloscope.
   CH-1: PB CUE/TP tool
6. Turn the power on.
7. Insert the alignment tape ZR2-1/P.

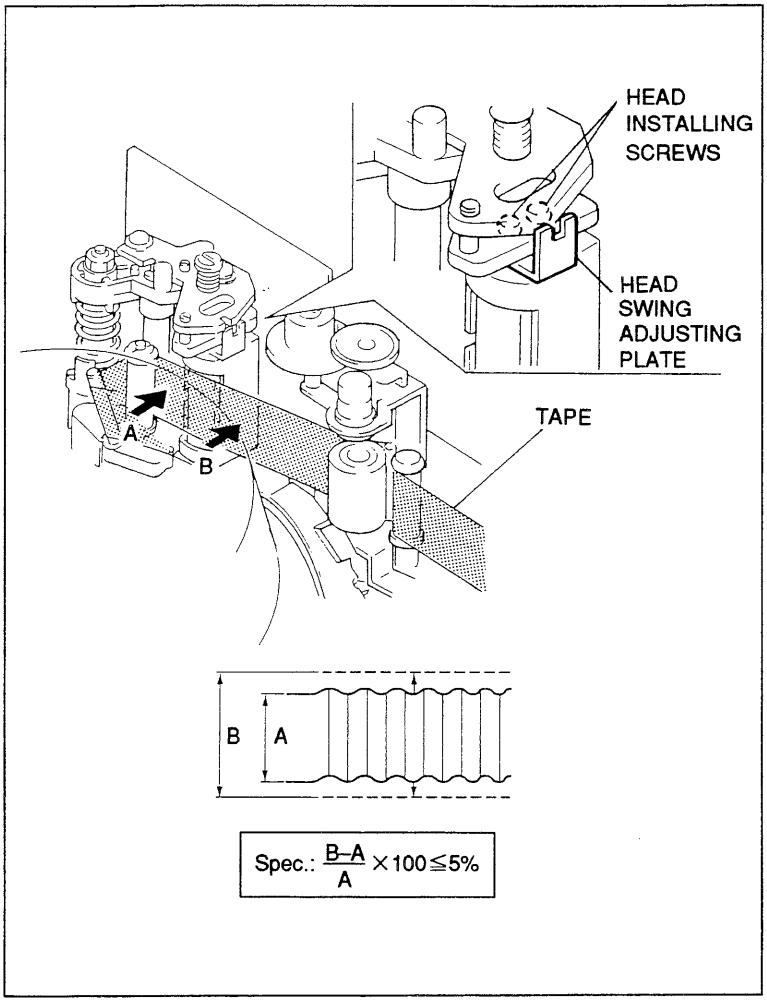
Checks

1. **Play back**
   Play back the ZR2-1/P (from 15:00 to 25:00).

2. **CUE head head-to-tape contact check**
   (1) Press lightly the portions A and B of the tape shown in the figure.
   (2) Check that the increase quantity of the output level meets the specification.

   Specification:The increase quantity of the output level is within 5%.

   If the specification does not meet, carry out step 3 and later.



Adjustments

3. **CUE head head-to-tape contact adjustment**
   (1) Loosen the two head installing screws 1/4 to 1/2 turn.
   (2) Put the (–2) mm screwdriver in the notch of the head swing adjusting plate.
   (3) Turn the screwdriver and adjust the CUE head position so that the output level is the maximum.
   (4) While holding the screwdriver in the step (3), tighten the two screws.
   19×10^{-2} N•m (1.9 kgf•cm)

4. **CUE head head-to-tape contact re-check**
   Re-check according to the steps 1 and 2.

5. **CUE head azimuth adjustment**
   Refer to section 7-4-6.

6. **CUE head head-to-tape contact check**

7. **CUE head height check**
   Refer to section 7-4-5.

8. **CUE/TC head position adjustment**
   Refer to section 7-4-8.

7-4-8. CUE/TC Head Position Adjustment

Notes

- Before carrying out this adjustment, be sure to finish the CTL head position adjustment. The CUE/TC head position adjustment carries out as the standard position of the CTL head.
- The CUE/TC head position adjustment closely related to the height, azimuth and head-to-tape contact adjustments of the CUE head. After CUE/TC head position adjustment, be sure to carry out the adjustments or checks of the CUE head.

Tools

- Alignment tape, ZR2-1 (NTSC) : 8-960-073-11
- Alignment tape, ZR2-1P (PAL) : 8-960-073-61
- Torque screwdriver bit (for M2) : J-6325-380-A
- Torque screwdriver (for 3 kg) : J-6325-400-A
- TP tool : J-6420-910-A
- Oscilloscope

Setting

1. Turn the power off.
2. Connect the 8pin connector of the TP tool to the connector CN7 on the HN-189 board.
3. Connect the 5pin connector of the TP tool to the connector CN3 on the CTL-10 board.
4. Select the switches S1-1 and S1-2 on the HN-189 board to the OFF.
5. Connect an oscilloscope.
   CH-1 : SHAPED CTL/TP tool
   CH-2 : PB TC/TP tool
   TRIG : SV REF CF/TP tool
6. Turn the power on.
7. Insert the alignment tape ZR2-1/P.

Checks

1. **Play back**
   Play back the ZR2-1/P (from 00:00 to 15:00).

2. **CUE/TC head position check**
   (1) Check that the positional relation of the falling edge of the CTL pulse, and the rising edge of the TC signal meet the specification.

   If the specification does not meet, carry out step 3 and later.

   (2) Repeat the mode change from EJECT mode to PLAY mode 2 or 3 times. Check that the specification meets.

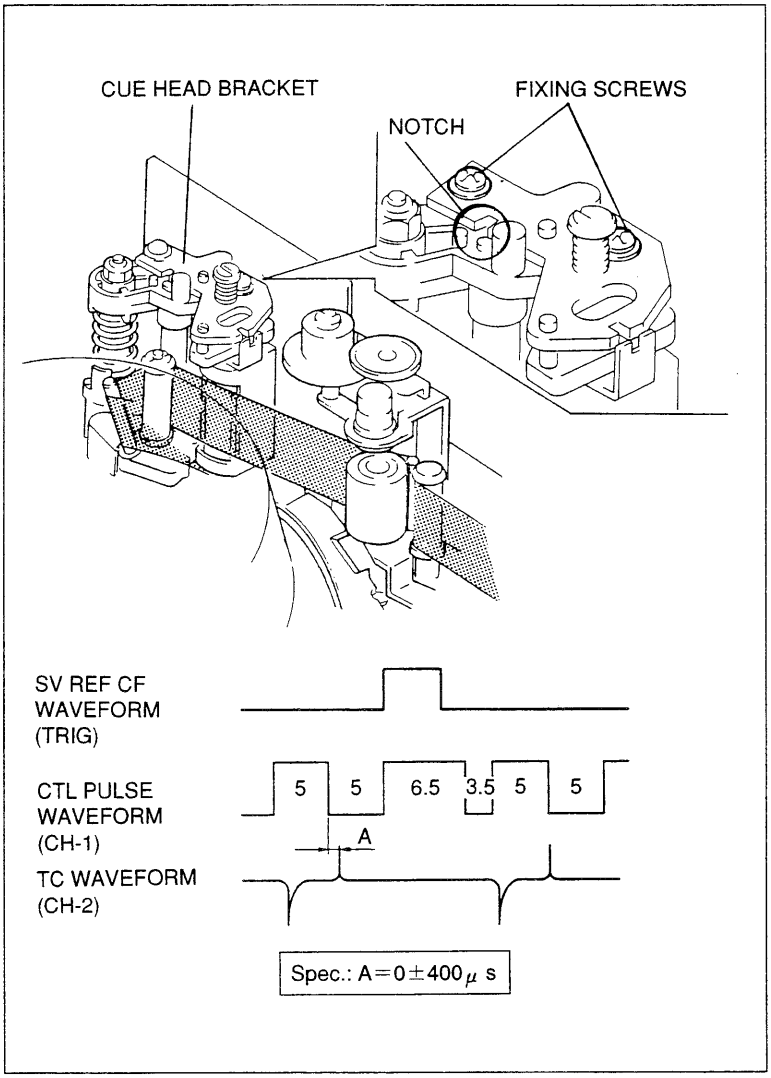
   If the specification does not meet, carry out the step 3 and later.

   (3) Repeat the mode change from REV mode to PLAY mode 2 or 3 times.
   Check that the specification meets.

   REV search mode
   - Press the REW button after pressing the PLAY button. (The PLAY and REW buttons on the keyboard light up.)

Adjustment

3. **CUE/TC head position adjustment**
   (1) Loosen the screws of the CUE head bracket 1/4 to 1/2 turn.
   (2) Put the (–) 3 mm screwdriver in the notch of the CUE head bracket.
   (3) Turn the screwdriver and adjust the CUE/TC head position so that the specification meets.
   (4) While holding the screwdriver in the step (3), tighten the two screws.
   19×10^{-2} N•m (1.9 kgf•cm)



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Checks and adjustment after this ajustment

4. **CUE/TC head position re-check**
   Re-check the according to the steps 1 and 2.

5. **CUE head azimuth adjustment**
   Refer to section 7-4-6.

6. **CUE head head-to-tape contact check**
   Refer to section 7-4-7.

7. **CUE head height check**
   Refer to section 7-4-5.

8. **CUE/TC head position re-check**
   Re-check according to the steps 1 and 2.

7-4-9. CUE Output Level Check

Tools

- Alignment tape, ZR2-1 (NTSC) :8-960-073-11
- Alignment tape, ZR2-1P (PAL) :8-960-073-61
- TP tool :J-6420-910-A
- Oscilloscope

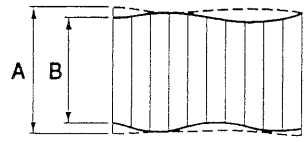
Setting

1. Turn the power off.
2. Connect the 8pin connector of the TP tool to the connector CN7 on the HN-189 board.
3. Connect the 5pin connector of the TP tool to the connector CN3 on the CTL-10 board.
4. Select the switches S1-1 and S1-2 on the HN-189 board to the OFF.
5. Connect an oscilloscope.
   CH-1: PB CUE/TP tool
   TRIG: CH-1
6. Turn the power on.
7. Insert the alignment tape ZR2-1/P.

Check

1. CUE output level check

(1) Play back the ZR2-1/P (from 15:00 to 25:00).
(2) Check that the fluctuation of the CUE output level meets specification 1.
(3) Select the dip switch S1-1 on the HN-189 board to the ON.
(4) Press the switch S3 on the HN-189 board 10 times.
(5) Play back the ZR2-1/P (from 00:00 to 15:00).
(6) Make a memo of the CUE output level. (This level is as the C.)
(7) Press the REW button and put into the REV state.
(8) Check that the CUE output level (This level is as the D.) meets specification 2.
(9) After checking, select the dip switch S1-1 on the HN-189 board to the OFF.



Spec.1: $\frac{A-B}{A} \times 100 \leqq 5\%$(fluctuation)

Spec.2: $\frac{D}{C} \times 100 \geqq 70\%$

SECTION 8
REPLACEMENT OF CIRCUIT BOARDS

8-1. GENERAL INFORMATION FOR BOARDS REPLACEMENT

Index for board replacement

Board	Section	Adjustment
AD-97	8-2-3	△
AIF-5	8-4-3	△
AT-84	8-2-3	△
CN-884	8-4-5	×
CN-1019 *1	8-2-1	×
CN-1020 *1	8-2-1	×
CN-1103 *2	8-2-2	×
CN-1104 *2	8-2-2	×
CN-1105 *2	8-2-2	×
DA-76A	8-2-3	○ (Refer to sections 5-2-1and 5-2-2 for DVW-700/700P.) (Refer to sections 5-4-1 and 5-4-2 for DVW-700WS/700WSP.)
DAP-1	8-2-3	×
DBD-1	8-2-3	×
DDE-1	8-2-3	×
DEN-1	8-2-3	×
DP-213 *2	8-2-3	×
DRC-3	8-2-3	×
EQ-48(1)	8-2-3	○ (Refer to section 5-3-3.)
EQ-48(2)	8-2-3	○ (Refer to section 5-3-3.)
IF-443	8-2-3	×
KY-293	8-4-4	×
MA-62	8-4-2	×
PE-29	8-2-3	×
PS-333	8-4-5	×
SH-47	8-2-3	×
SV-148	8-2-3	×
SW-636	8-4-1	×
SY-191	8-2-3	×
VA-144	8-2-3	△

○ : These boards are necessity to adjust after replacement.

△ : These boards are necessity to adjust after replacement.
(Refer to Maintenance Manual Part2 Volume1 section 4-6.)

× : These boards are no necessity to adjust after replacement.

*1 : for DVW-700/700P Only
*2 : for DVW-700WS/700WSP Only

Consult the Sony service engineer when replacing the △-marked board and the boards not listed in this table.

8-2. RELAY BOARD AND PLUG-IN BOARD REMOVAL AND INSTALLATION

Turn off the power, open the inside panel, and perform the procedure below. (For how to open the inside panel, refer to section 1-5.)

NOTE

Do not remove the relay board frequently. This may cause a poor connection between the connectors on the relay board and plug-in board. After the relay board was attached, be sure to confirm the connection state of the connectors on the CN-1019 and CN-1020 boards for DVW-700/700P, CN-1103, CN-1104 and CN-1105 boards for DVW-700WS/700WSP by using a DP DIAG STATUS of the DIAGNOSTIC mode. (Refer to section 3-2.)

All the PULSEs should be normal.
The DET→PR should be all normal.
(Confirmation of the CN-1019 board for DVW-700/700P.)
(Confirmation of the CN-1103 and CN-1104 boards for DVW-700WS/700WSP.)
The PR→EN should be all normal.
(Confirmation of the CN-1020 board for DVW-700/700P.)
(Confirmation of the CN-1105 board for DVW-700WS/700WSP.)
The PR→RCV should be all normal.
(Confirmation of the CN-1020 board for DVW-700/700P.)
(Confirmation of the CN-1105 board for DVW-700WS/700WSP.)

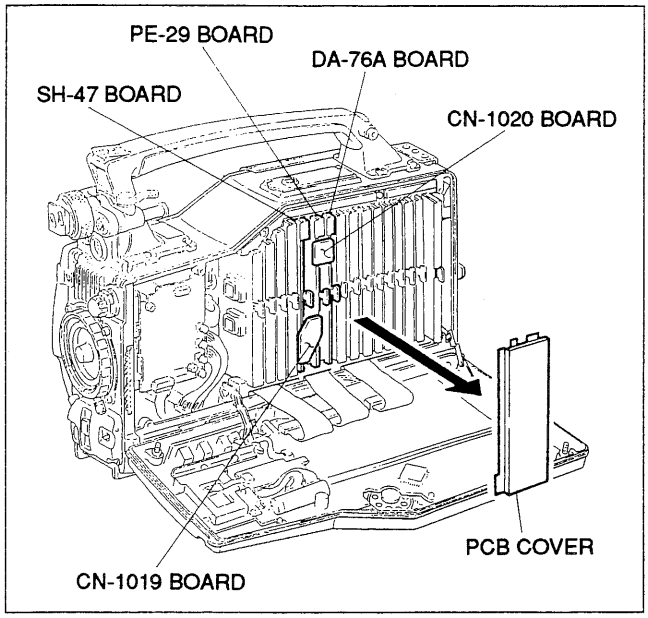
If even one NG display appears(poor connection happens), confirm the connection state.
For poor connection, replace the CN-1019 board, CN-1020 board for DVW-700/700P, CN-1103 board, CN-1104 board and CN-1105 board for DVW-700WS/700WSP, or plug-in board.

8-2-1. Relay Boards (CN-1019 and CN-1020) Removal and Installation (for DVW-700/700P)

These boards are mounted in the front of DA-76A, PE-29, and SH-47 boards. To remove the above plug-in boards, remove the PCB cover and these relay boards first.

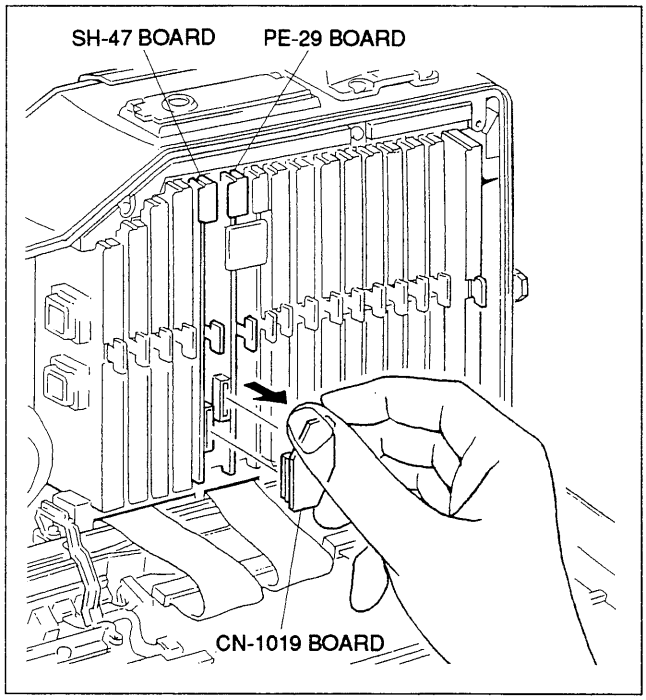
NOTE

Remove the relay boards little by little while holding them so that these boards are not damaged during removal.

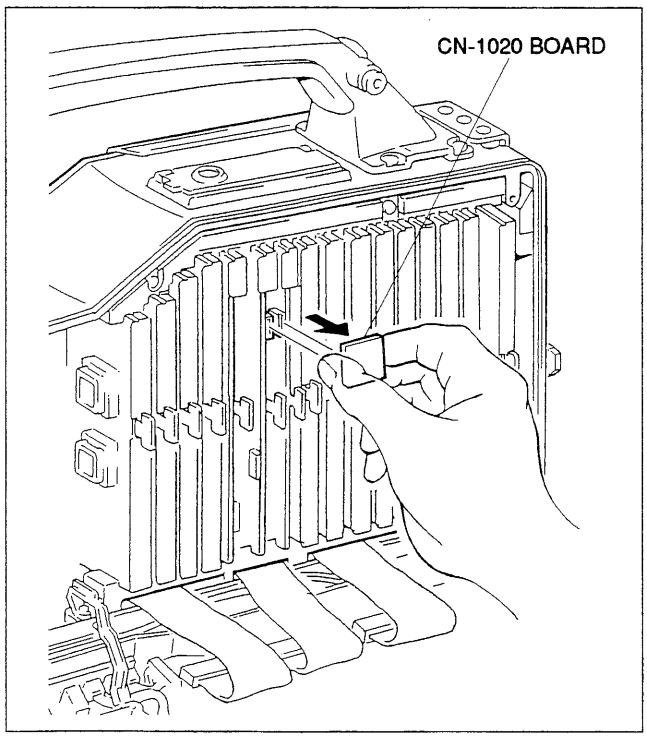


Removal

1. **CN-1019 board**
   Put fingers between the DA and PE boards and loosen the connection of connector CN2 on the PE board. After that, disconnect connector CN1 on the SH board.



2. **CN-1020 board**
   Hold both sides of this board and remove it while applying force alternately and loosening the connector gradually.



Installation

1. Adjust the connector position of these boards and insert them slowly and securely.

   NOTE
   Be sure to insert these boards completely.

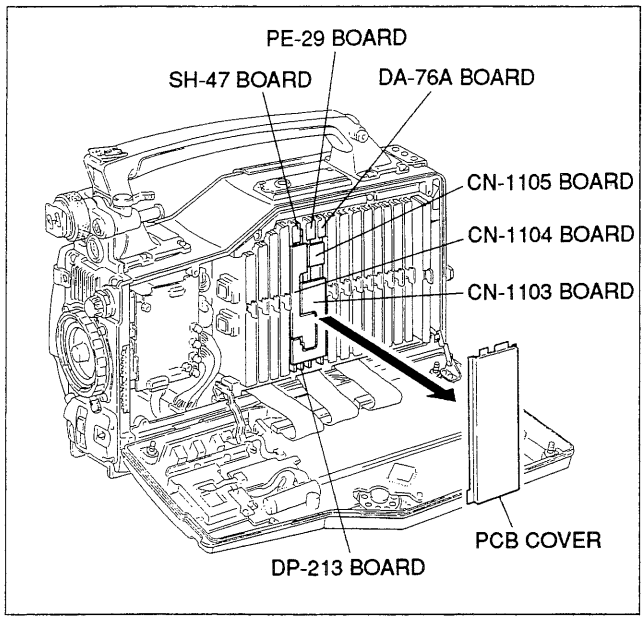
2. Install the PCB cover in front of DA-76A, PE-29 and SH-47 board.

8-2-2. Relay Boards (CN-1103, CN-1104 and CN-1105) Removal and Installation (for DVW-700WS/700WSP)

These boards are mounted in the front of DA-76A, PE-29, DP-213 and SH-47 boards. To remove the above plug-in boards, remove the PCB cover and these relay boards first.

NOTE

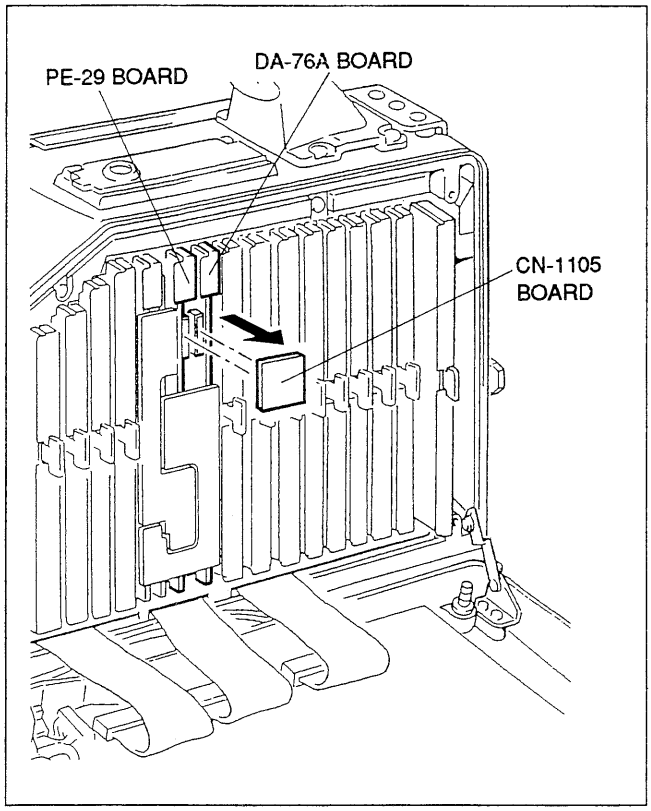
Remove the relay boards little by little while holding them so that these boards are not damaged during removal.



Removal

1. CN-1105 board

Hold up and down sides of this board and remove it while applying force alternately and loosening the connector gradually.

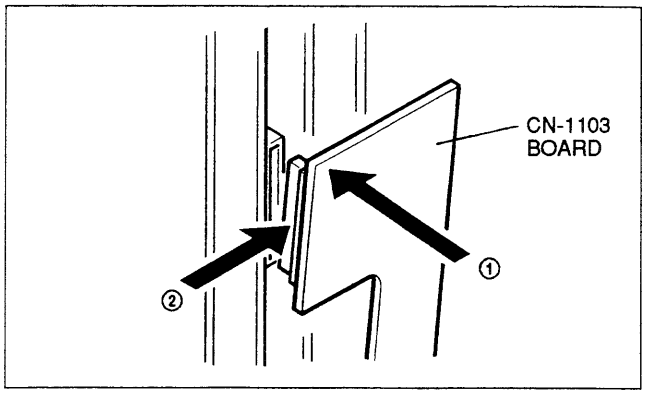


2. CN-1103 board

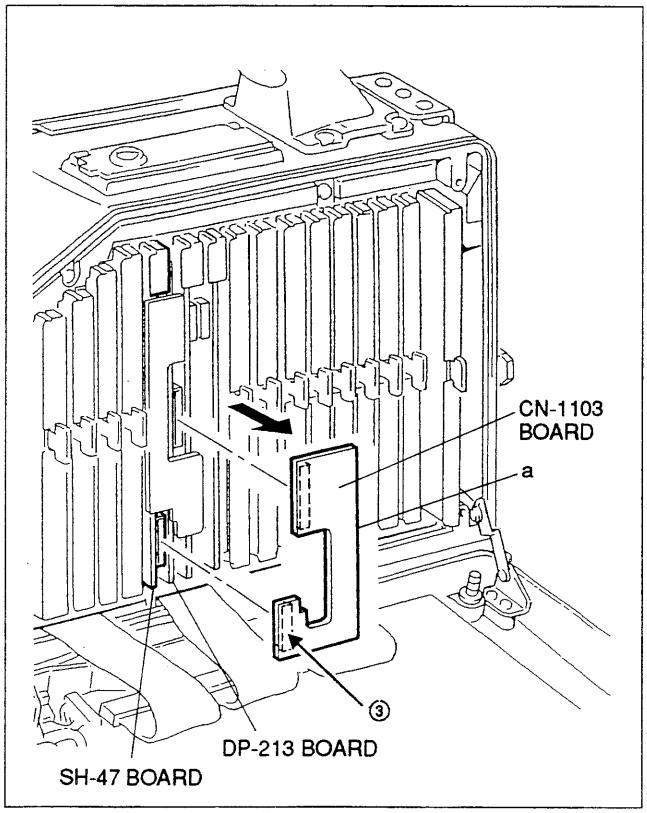
NOTES

- Remove the CN-1105 board first, then perform the following procedure.
- Not exert a force on the position a.

Pull the ① portion of this board about 3 mm toward outside of the cabinet, and push the same ① portion toward the cabinet as shown in the figure, then the connection at bottom side of the connector will be loosen.
While keeping this state, pull the ② portion of this board, and disconnect the connector connected to DP board little by little.



After that, hold ③ portion of this board, and loosen the connection of the connector connected to SH board little by little.

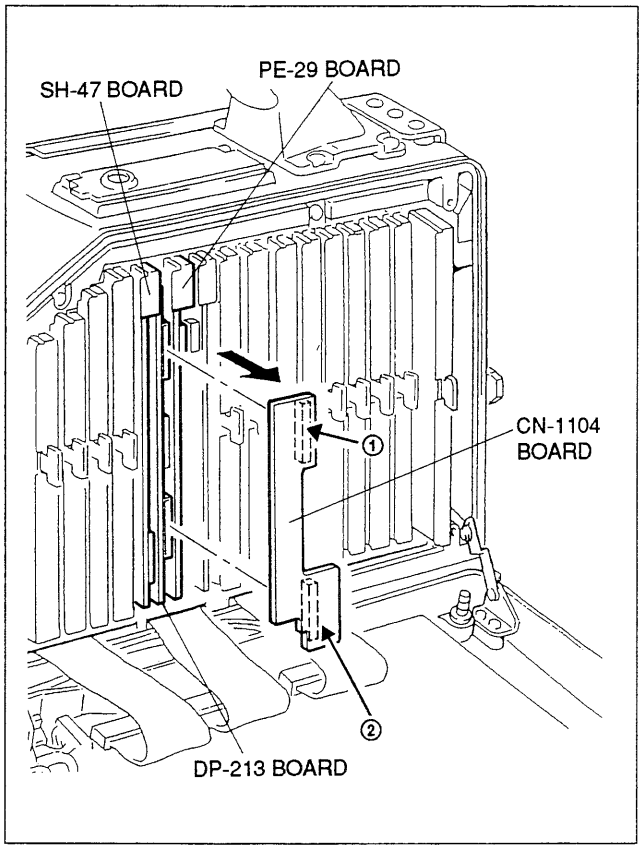


3. CN-1104 board

NOTE

Remove the CN-1105 and CN-1103 boards first, then perform the following procedure.

Hold ① portion of this board, and loosen the connection of the connector connected to DP board little by little. After that, hold ② portion, and loosen the connection of the connector connected to PE board as the same way.



Installation

1. Adjust the connector position of these boards and insert them slowly and securely.

   NOTE
   Be sure to insert these boards completely.

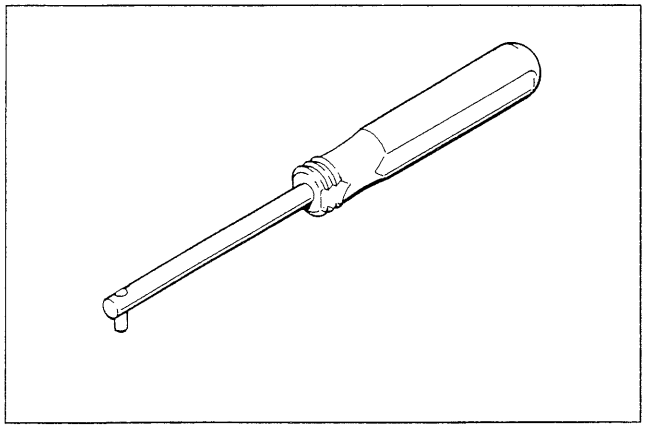
2. Install the PCB cover in front of DA-76A, PE-29, DP-213 and SH-47 boards.

8-2-3. Plug-in Board Removal and Installation

NOTE

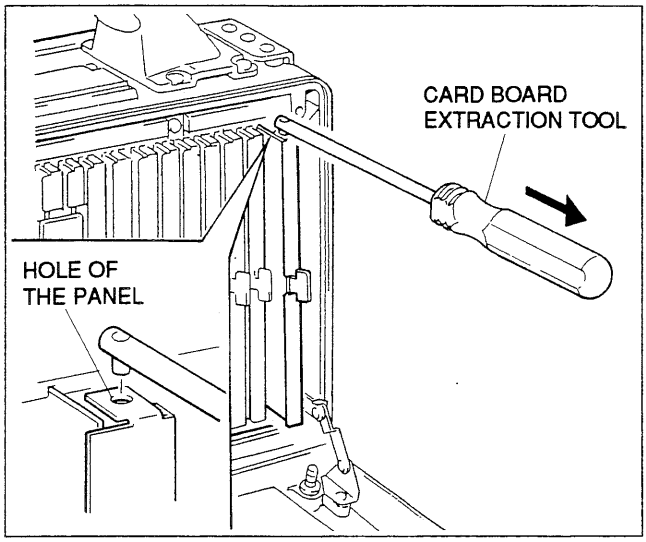
Before removing the plug-in boards (DA-76A, PE-29, DP-213 and SH-47 boards), remove the relay boards (CN-1019 and CN-1020 boards for DVW-700/700P, CN-1103, CN-1104 and CN-1105 boards for DVW-700WS/700WSP) mounted in the front of these plug-in boards.

It is recommended to use the following tool to remove each board from the unit.
Card board extraction tool (Sony part No.: J-6309-350-A)

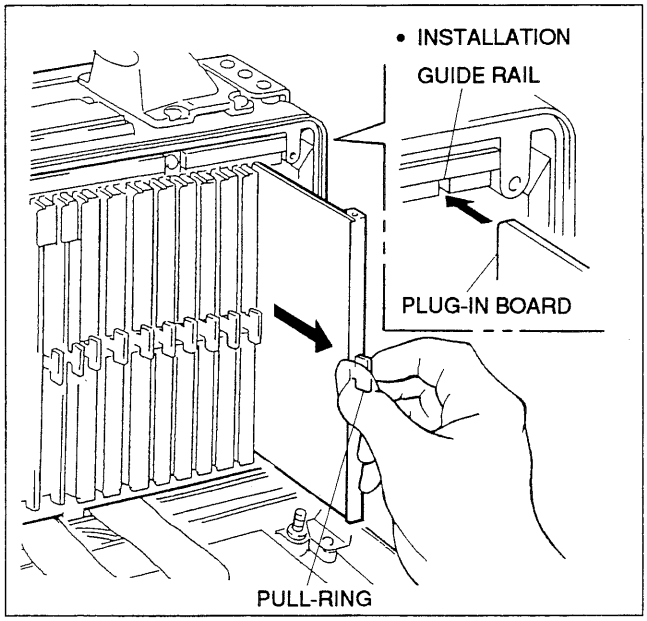


Removing the Plug-in Boards using Tool

1. Insert a card board extraction tool into the hole of the panel at the top of each board, move it in the direction indicated by the arrow, and disconnect the connectors connected to the mother board.

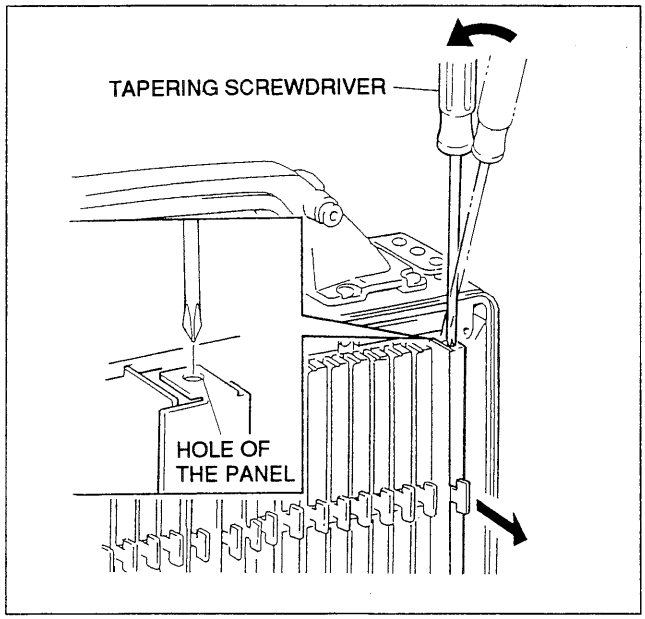


2. Hold the pull-ring in the front of the boards and remove each board from the unit.



Removing the Plug-in Boards without Tool

1. Insert a tapering screwdriver into the hole of the panel at the top of each board, move it in the direction indicated by the arrow, and disconnect the connectors connected to the mother board.



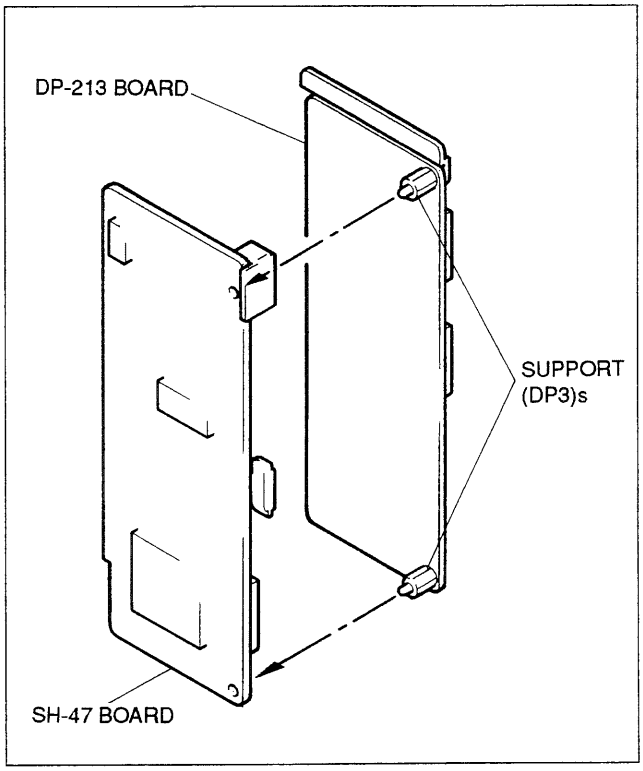
2. Hold the pull-ring in the front of the boards and remove each board from the unit.

Installation

1. Insert each board along the upper and lower board guide rails.
2. Hold each board tightly at the top and bottom and insert the board connectors into the mother board.

DP-213 Board Installation (for DVW-700WS/700WSP)

1. Insert the support (DP3)s on the DP board into the holes of the SH board.



2. Insert the SH board and the DP board along the upper and lower board guide rails.
3. Hold the SH board tightly at the top and bottom, and insert the board connectors into the mother board.

NOTE

Confirm the connections between SH board and DP board are not loosened.

8-3. REMOVAL AND INSTALLATION OF FLEXIBLE CARD WIRES ON TC-75 BOARD

Three 28-pin flexible card wires are used between the MB-500 and TC-75 boards. Be careful not to break these flexible card wires. This shortens the wire life.

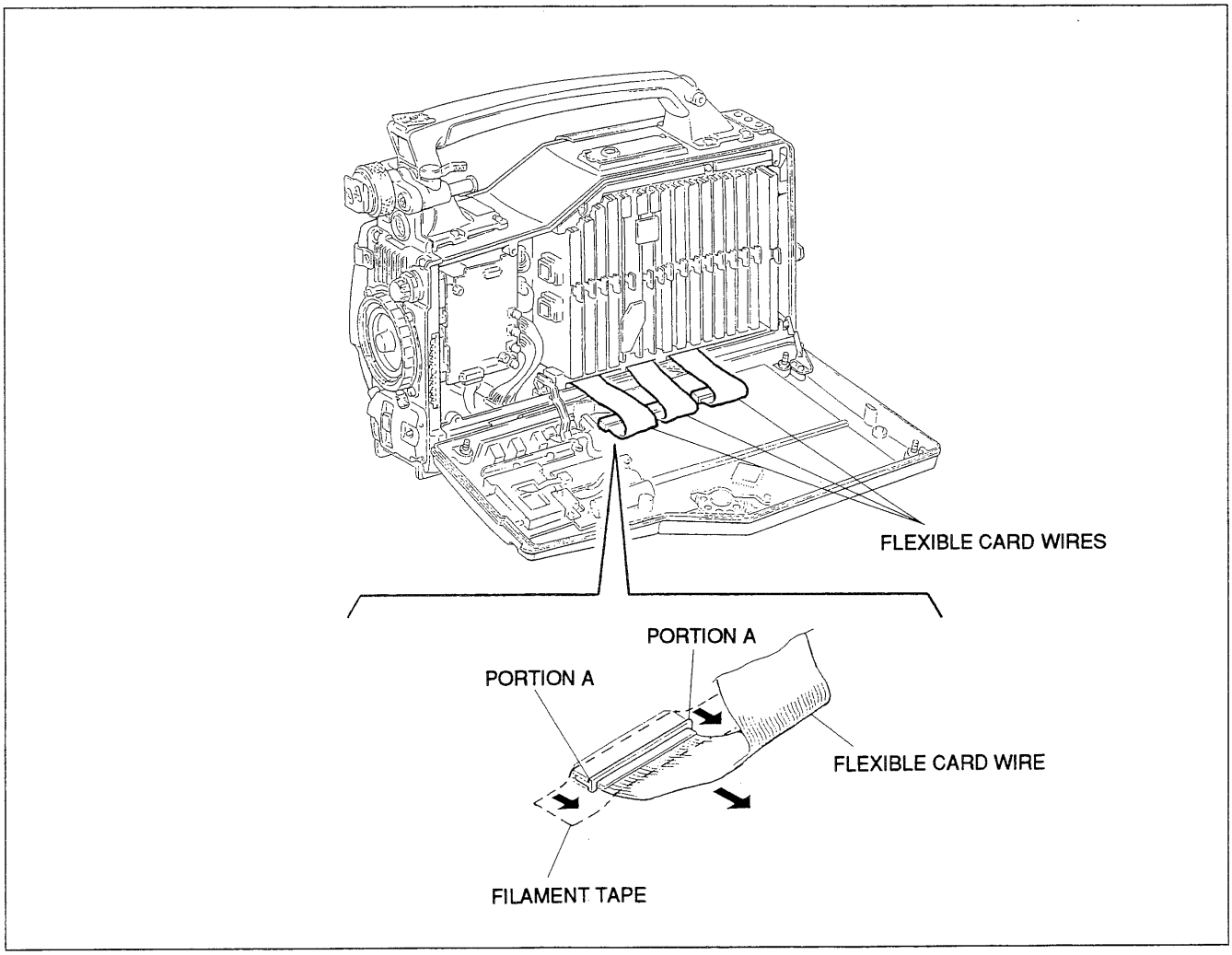
Removal

1. Turn off the power.
2. Peel off the filament tape, being carefull not to damage the printed circuit board and flexible card wire.
3. Slide portion A in the direction indicated by the arrow, unlock it, and pull out the flexible card wires.

Installation

NOTE
Be careful not to insert the flexible card wires obliquely.

1. Check that the conductive surface of the flexible card wire is not soiled with dust.
2. Slide portion A in the direction indicated by the arrow and insert the flexible card wires tightly into each connector with the conductive surface of these wires put down.
3. Slide portion A in the reverse direction of the arrow and lock each connector.
4. Fix the flexible card wire and connector with filament tape as shown in the figure.



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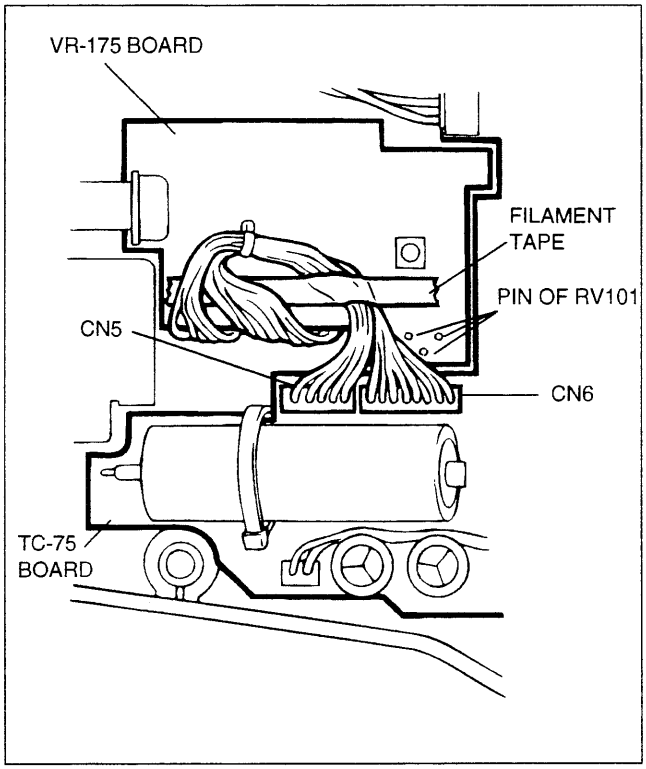
8-4. HARNESS DRAWING ON THE VR-175 BOARD

NOTE

When close the inside panel, there is a possibility that the harness between the TC-75 board and VR-175 board is touched with lead pins of the volume on the VR-175 board pressing the shield plate on the SV-148 board.

When replace the VR-175 board, perform the following procedure.

- Fix the harness between the TC-75 board and VR-175 board with filament tape as shown in the figure.
  When fix with filament tape, being careful not to touch the harness at the pins of the variable resistor (RV101) on the VR-175 board.



8-5. BOARD REPLACEMENT

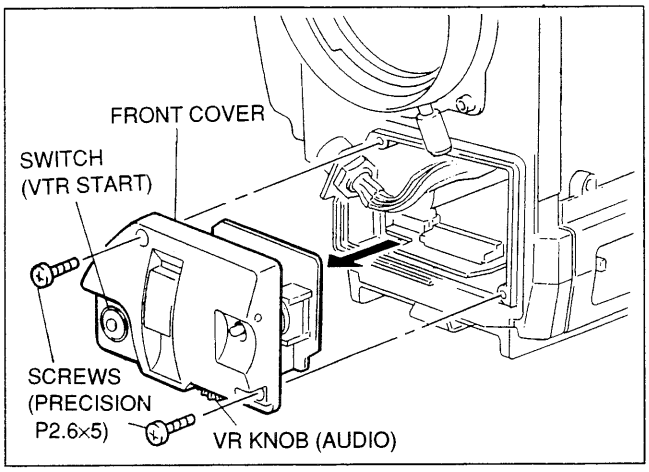
NOTE

- Turn off the power and perform the following procedure.
- Screwdriver mark and following numbers are indicating the value of fastening torque.

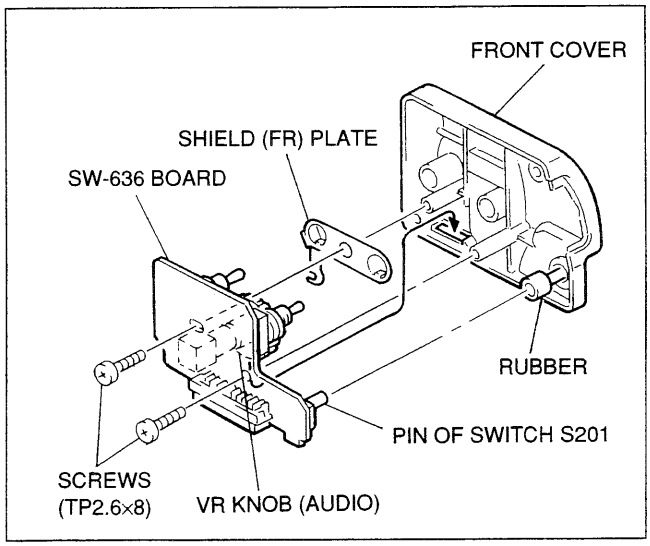
8-5-1. SW-636 Board

Removal

1. Open the inside panel. (Refer to section 1-5.)
2. Remove the two screws, then remove the front cover.

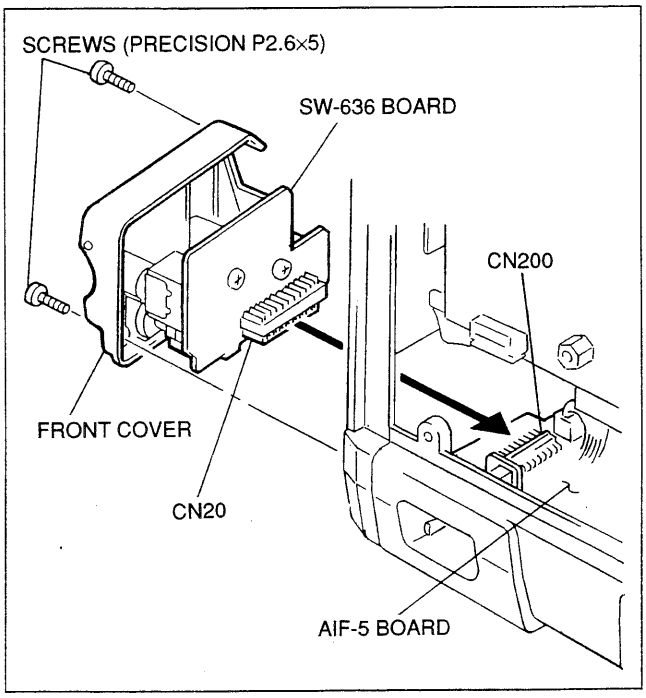


3. Remove the two screws, then remove the board from the front cover.



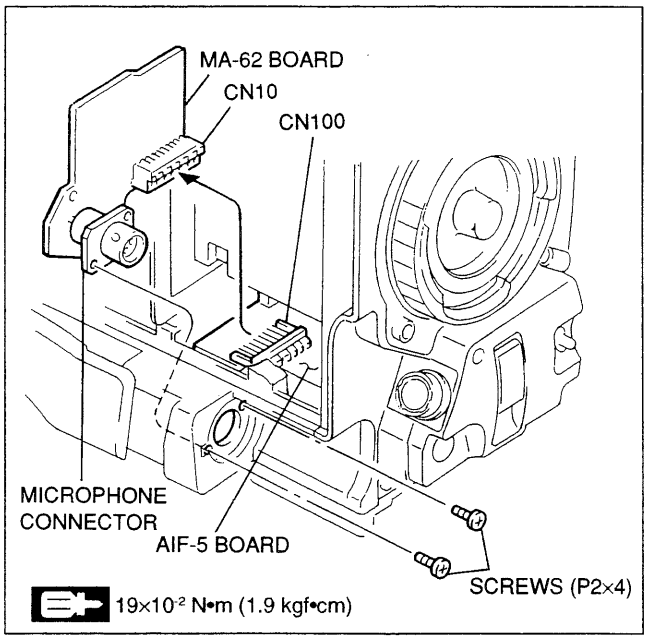
Installation

1. Attach the shield plate(FR) to the switches on the SW-636 board.
   Put the VR knob mounted on the SW-636 board into the hole of the front cover, and the pin of switch S201 into the rubber. Then install the board in the front cover with two screws.
   52×10^{-2} N•m (5.3 kgf•cm)
   After installation is completed, confirm that the sound of the VTR START switch is generated when push the switch.
2. Confirm from the inside panel side that the board-to-board connector CN20 on the SW-636 board is connected to the board-to-board connector CN200 on the AIF-5 board.
3. Install the front cover with two screws.
   52×10^{-2} N•m (5.3 kgf•cm)



8-5-2. MA-62 Board

1. Remove the outside panel. (Refer to section 1-5.)
2. Remove the two screws of the microphone connector.
3. Disconnect the board-to-board connector CN10 on the MA-62 board from the board-to-board connector CN100 on the AIF-5 board.

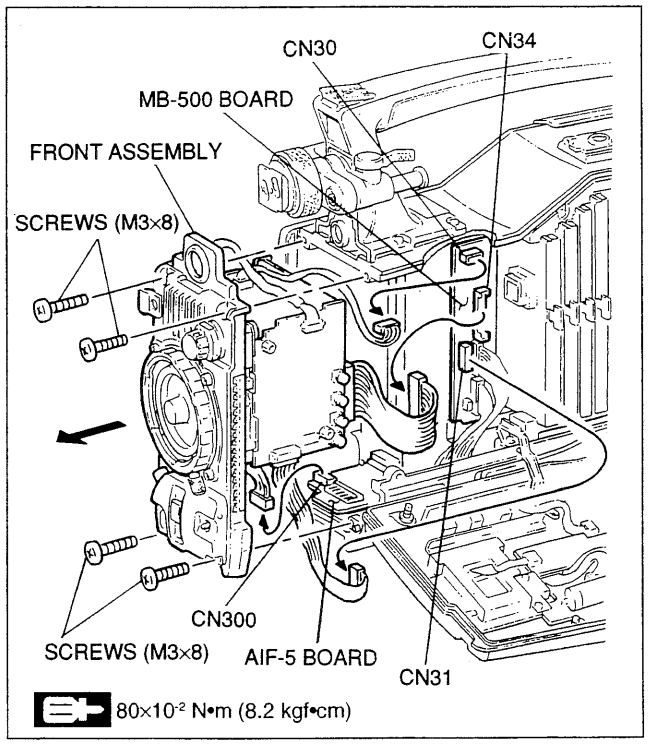


8-5-3. AIF-5 Board

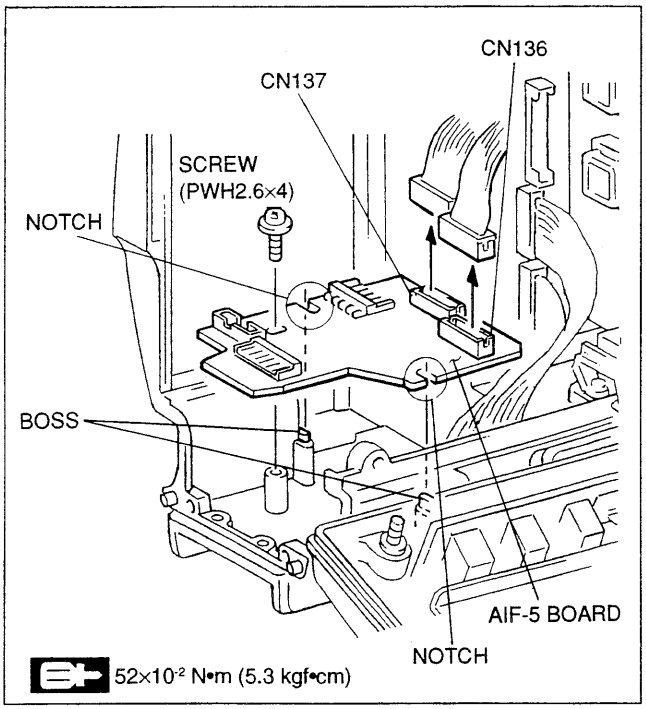
NOTE

Remove the front assembly before removing the AIF-5 board.
After installing the front assembly, perform the tape running adjustment and video tracking adjustment.
(Refer to sections 7-4-1 and 7-4-2.)

1. Remove the four screws, disconnect connectors CN30, CN31, and CN34 on the MB-500 board and connector CN300 on the AIF-5 board, and remove the front assembly.



2. Remove the MA-62 board. (Refer to section 8-4-2.)
3. Disconnect the connectors CN136 and CN137 on the AIF-5 board and remove one screw fixing the board by stubby-phillips type screwdriver. (Less-than 140mm length is recommended.)

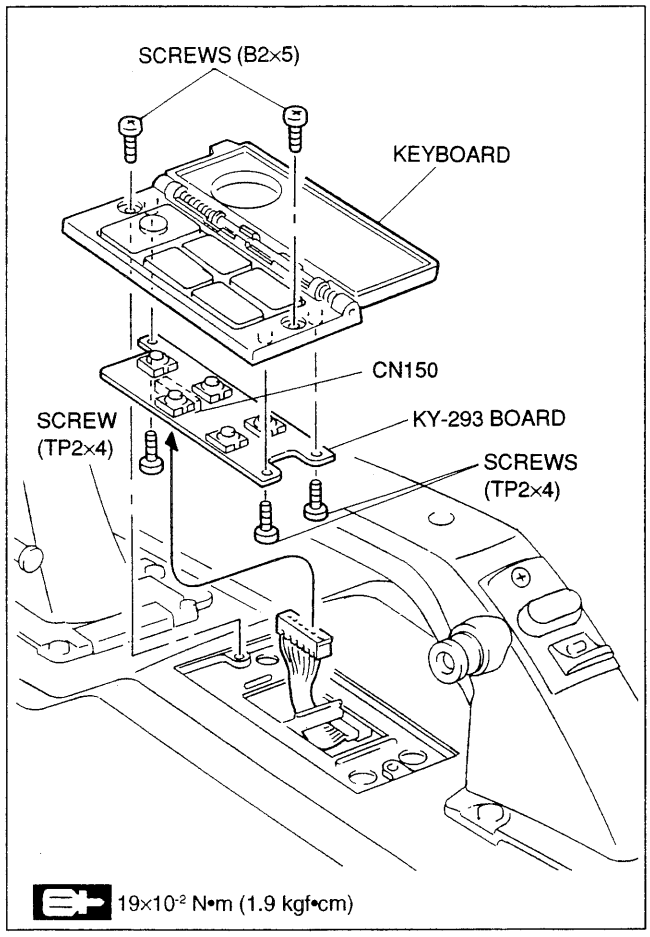


NOTES

- Insert the notch on the board into the boss shown in the figure during installation.
- Connect the connector CN20 on the SW-636 board and the connector CN200 on the AIF-5 board securely when the front assembly is installed.

8-5-4. KY-293 Board

1. Open the keyboard cover.
2. Remove the two screws and disconnect the connector CN150 on the KY-293 board.
3. Remove the three screws, then remove the board from the keyboard.



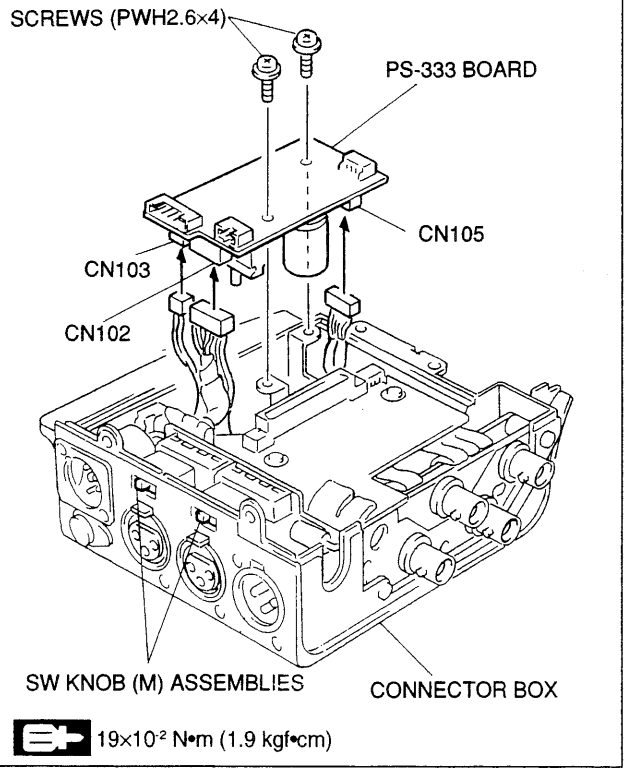
8-5-5. Connector Box Boards (PS-333 and CN-884)

NOTES

- Perform the following procedure with the battery pack and connector box removed.
  (For how to remove the connector box, refer to section 1-5.)
- After attaching the connector box, perform the tape running adjustment and video tracking adjustment.
  (Refer to sections 7-4-1 and 7-4-2.)

PS-333 Board

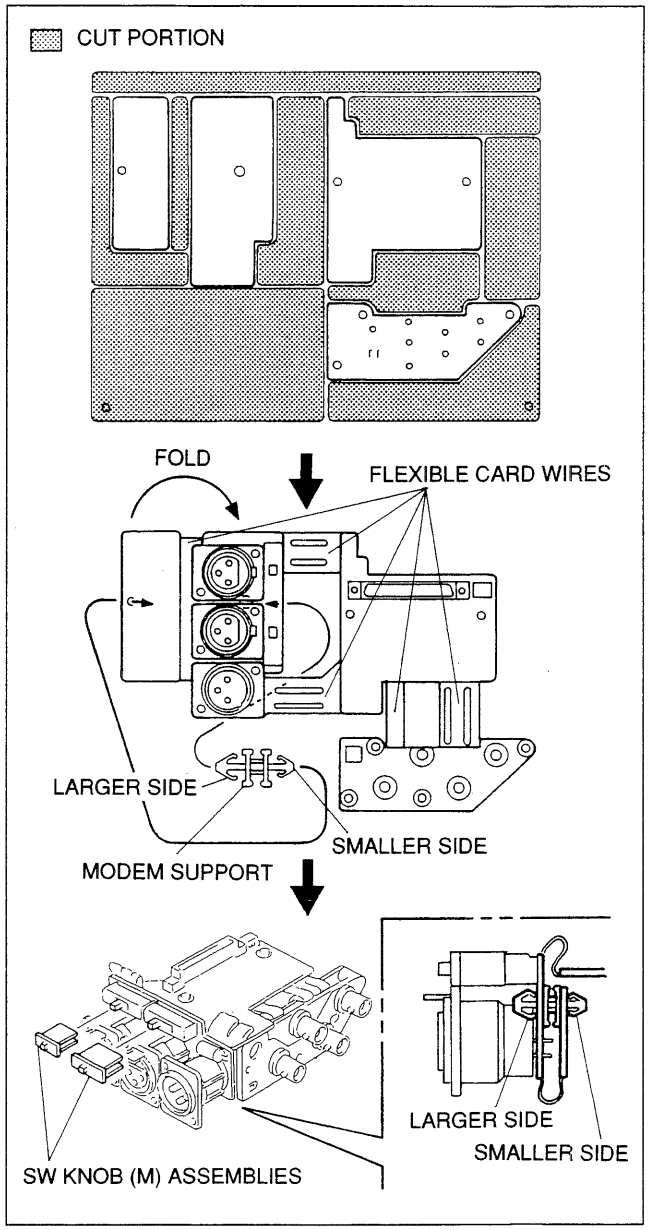
Remove the two screws fixing the board and disconnect the connectors CN102, CN103, and CN105.



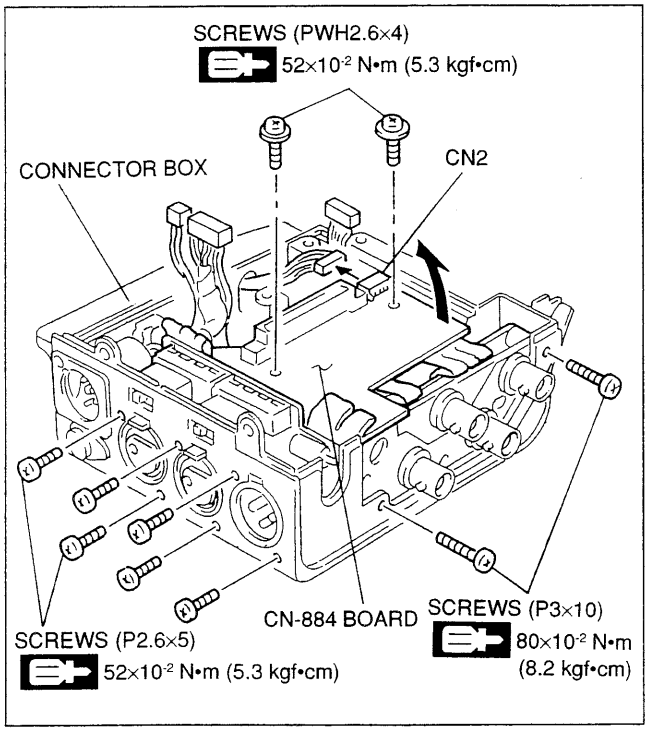
CN-884 Board

NOTES

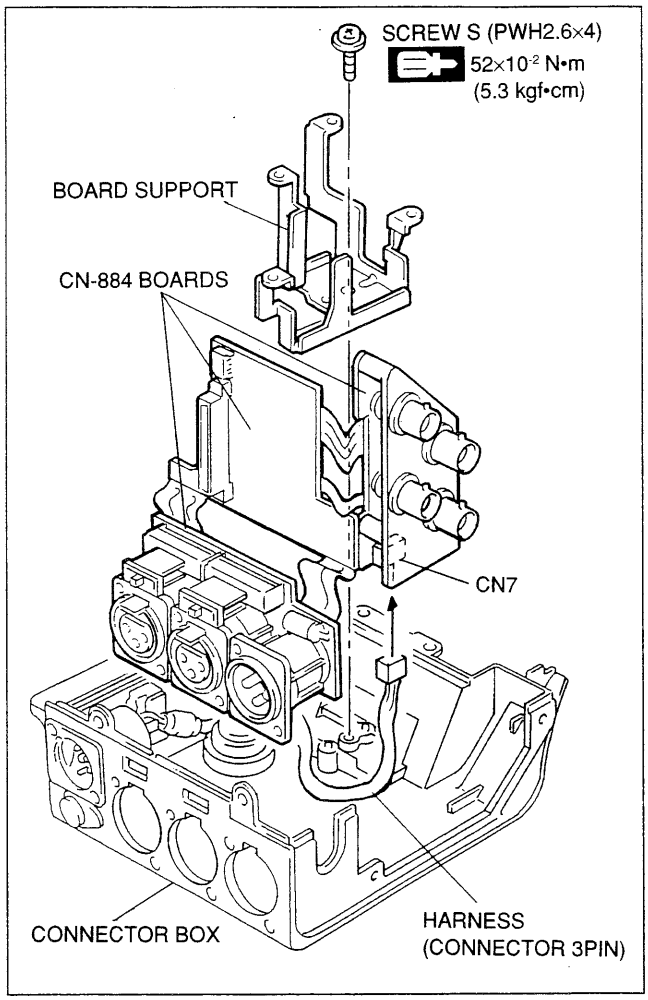
- Remove the PS-333 board, then perform the following procedure.
- Cut the perforation on the CN-884 board as shown in the figure and install a modem support and SW knob (M) assembly during use.



1. Disconnect the connector CN2 on the CN-884 board and remove the two screws fixing the board.
2. Remove the eight screws and open the board in the direction indicated by the arrow.



3. Remove the screw fixing the board support and disconnect the connector CN7 on the CN-884 board. Then, remove the board from the connector box.
When installing the CN-884 board, be careful not to pinch the 3pin connector's harness connected to REMOTE connector between the connector box and the CN-884 board.



SECTION 9
SPARE PARTS

9-1. NOTES ON SPARE PARTS

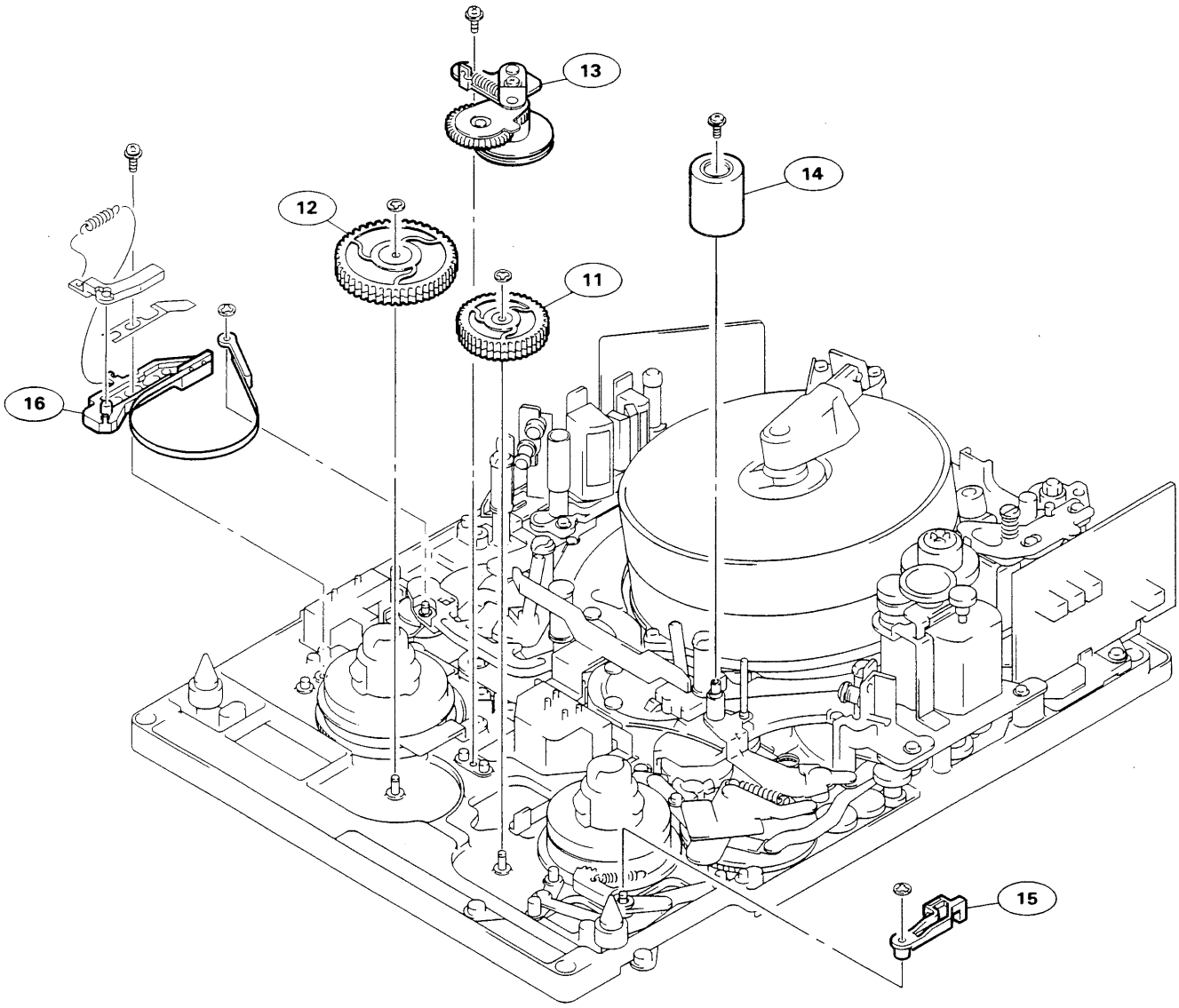
1. **Safety Related Components Warning**
   Components marked with ⚠ on this spare parts list is critical to safe operation. Replace these components with Sony parts whose part numbers appear in this manual or in service bulletin and service manual supplements pubulished by Sony.

2. **Standardization of Parts**
   Repair parts supplied from Sony Parts Center may not be always identical with the parts which actually in use due to "accommodating the improved parts and/or engineering changes" or "standardization of genuine parts".
   This manual's spare parts list is indicating the part numbers of "the standardized genuine parts at present".

3. **Stock of Parts**
   Parts marked with "o" SP (Supply Code) column of the spare parts list are not normally required for routine service work. Orders for parts marked with "o" will be processed, but allow for additional delivery time.

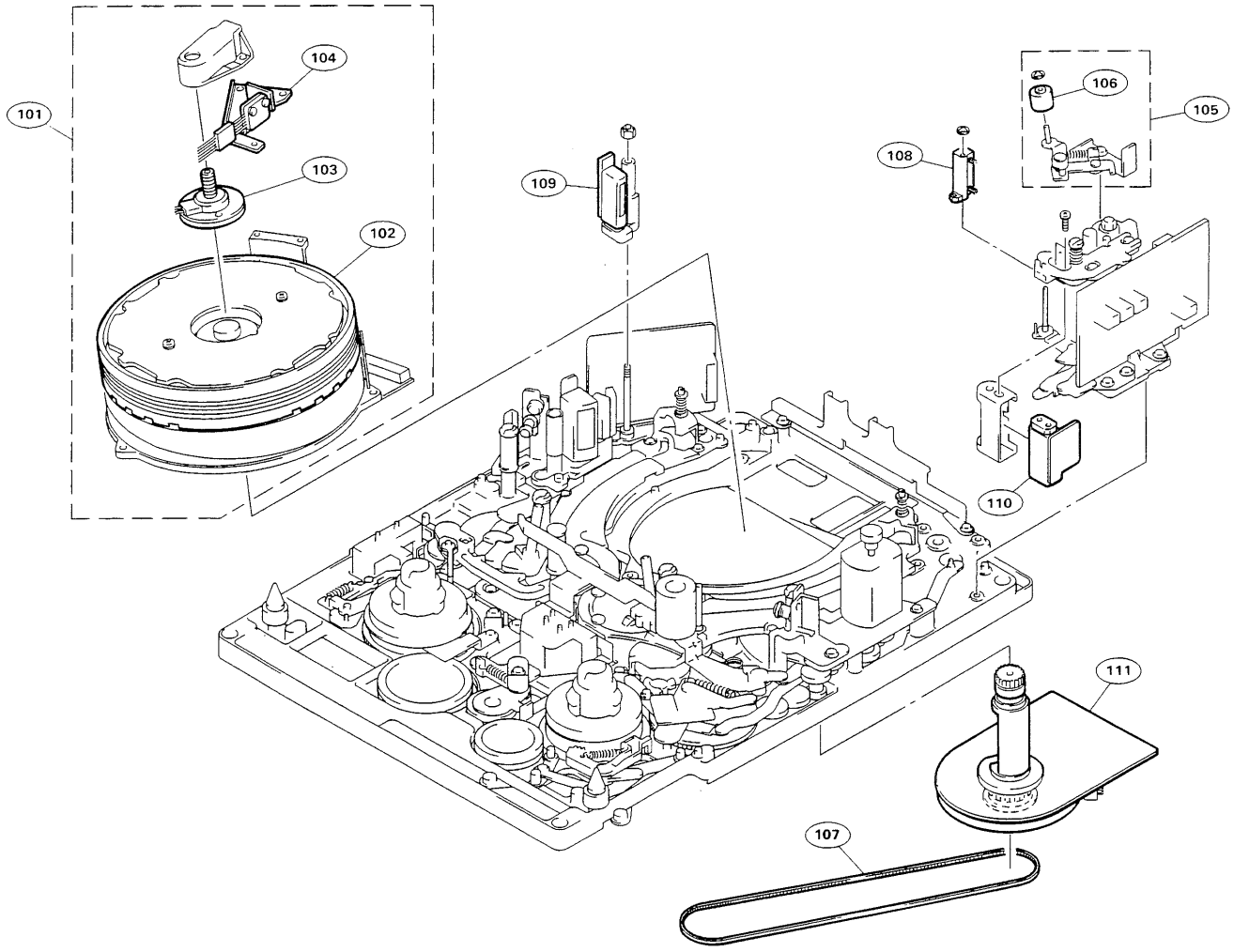
9-2. SPARE PARTS LIST

Mechanical Block 1



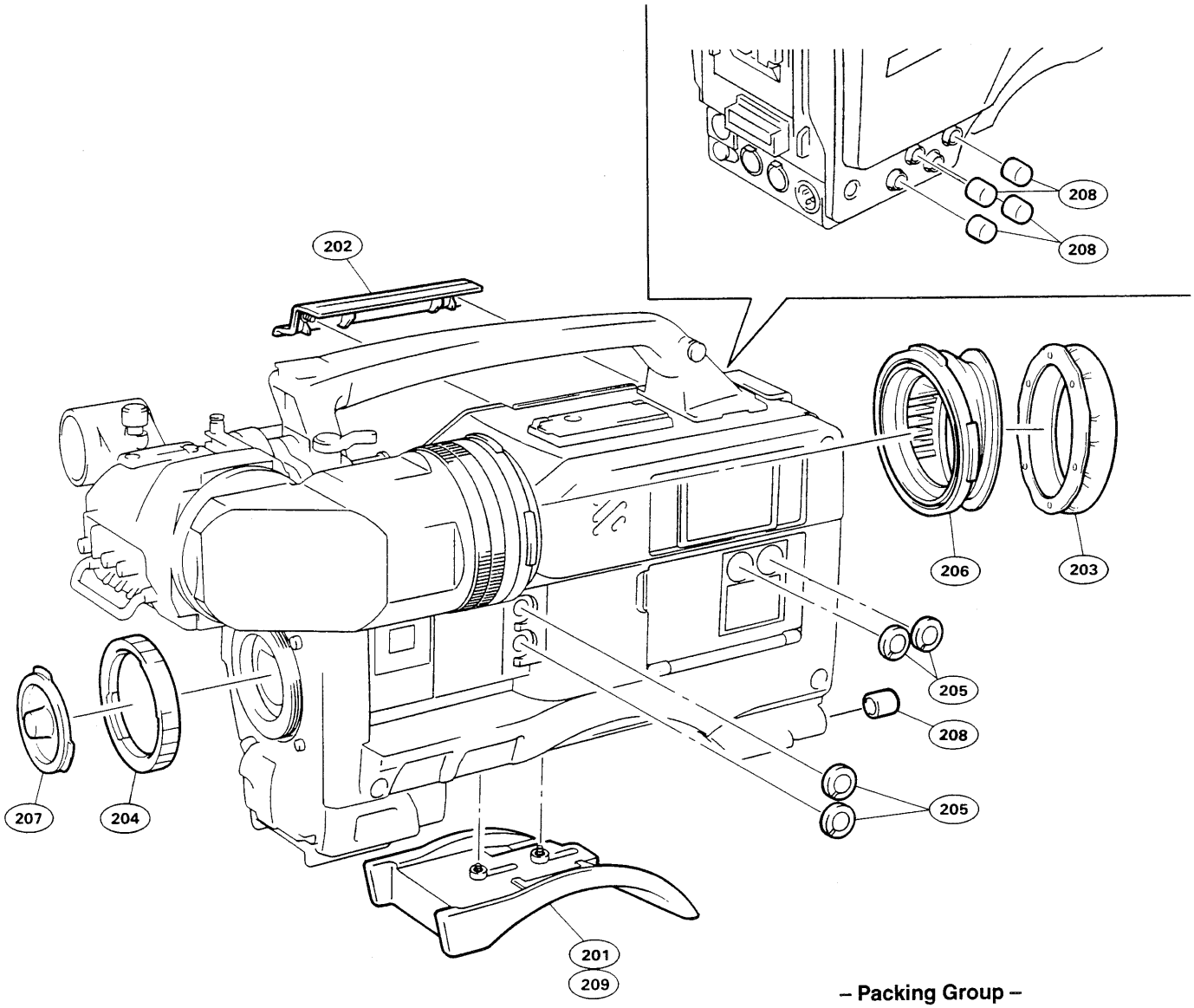
No.	Part No.	SP	Description
11	A-6740-091-D	s	IDLER ASSY, T
12	A-8278-142-A	s	IDLER ASSY, S
13	A-8278-034-A	o	GEAR ASSY
14	X-3676-032-4	s	PINCH ROLLER ASSY
15	X-3678-096-4	s	BRAKE ASSY, T SOFT
16	X-3678-114-2	s	BAND ASSY, TENSION REGULATOR

Mechanical Block 2



No.	Part No.	SP	Description
101	A-8263-623-A	s	DJH-10A-R (for PAL)
	A-8263-628-A	s	DJH-09A-R (for NTSC)
102	A-8263-624-A	s	DJR-10-R (for PAL)
	A-8263-641-A	s	DJR-09-R (for NTSC)
103	A-8263-855-A	s	RING ASSY(RP), SLIP
104	A-8263-856-A	s	BRUSH ASSY(RP)
105	A-8278-044-E	s	CLEANER ASSY, VH
106	X-3678-158-1	s	ROLLER ASSY, HC
107	3-679-723-01	s	BELT, TIMING
108	3-681-778-01	s	BRUSH, CUE
109	8-825-779-71	s	HEAD, CTL (PS244-21D)
110	8-825-779-61	s	HEAD, AU PS244-2103L
111	8-835-513-01	s	MOTOR, DC (SCV0701A)

Exterior Part

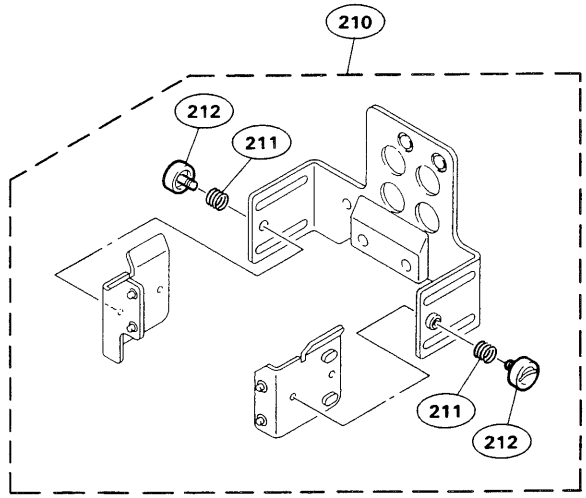


No.	Part No.	SP	Description
201	A-8278-288-A	s	PAD ASSY(NS), SHOLDER
202	X-3678-083-2	o	LID, FRONT ASSY
203	X-3678-187-1	s	EYE CUP CUSHION
204	3-186-442-01	o	RING, MOUNT
205	3-680-219-01	s	KNOB, VR
206	3-682-494-01	o	EYE CUP (S)
207	3-699-048-01	s	CAP MOUNT
208	3-717-823-01	s	COVER, BNC

<APPENDIX>

209	A-8278-385-A	s	PAD ASSY, SHOLDER
	Serial No. 10001 TO 10196 (DVW-700)		
	30001 TO 30170 (DVW-700)		
	40001 TO 40250 (DVW-700P)		
	10001 TO 10065 (DVW-700WS)		
	90001 TO 90002 (DVW-700WS)		
	30001 TO 30045 (DVW-700WS)		
	40001 TO 40415 (DVW-700WSP)		
210	A-8278-057-A	o	BRACKET ASSY (WRR)
211	3-668-152-01	s	SPRING, COMPRESSION
212	3-681-760-01	o	SCREW

– Packing Group –



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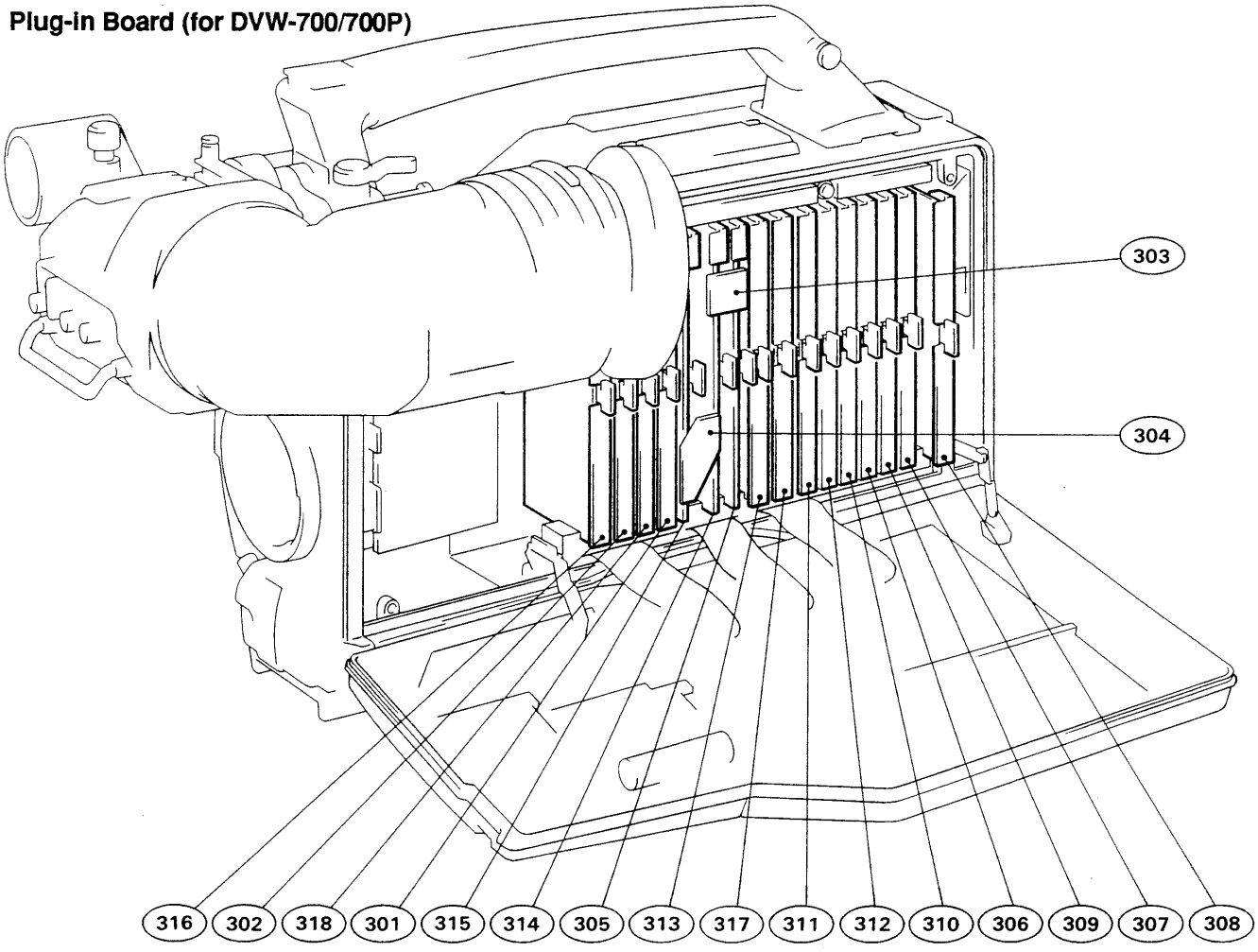
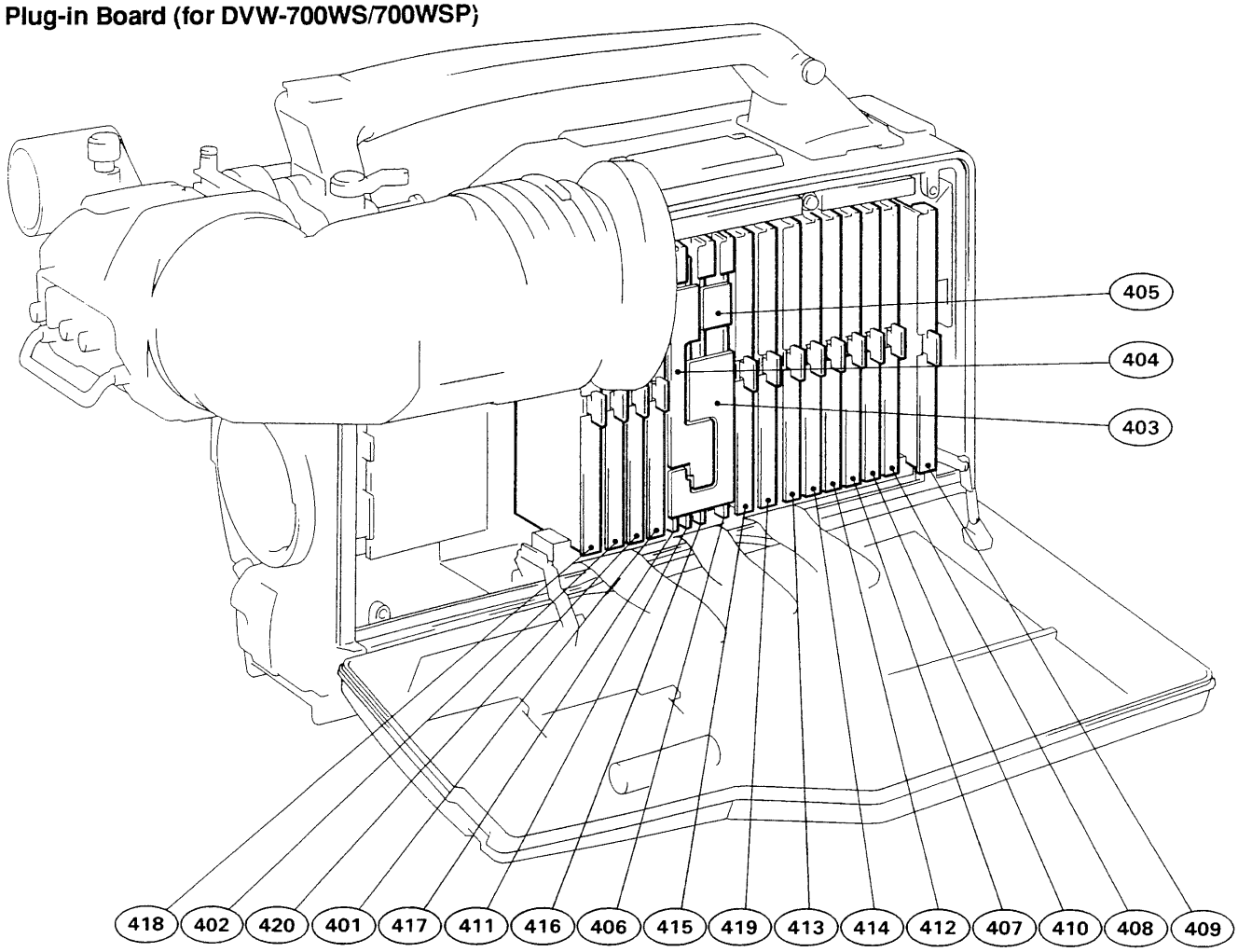
Plug-in Board (for DVW-700/700P)



No.	Part No.	SP	Description
301	A-8263-244-A	o	MOUNTED CIRCUIT BOARD, AD-97
302	A-8263-236-A	o	MOUNTED CIRCUIT BOARD, AT-84
303	A-8263-221-A	o	MOUNTED CIRCUIT BOARD, CN-1020
304	A-8263-247-A	o	MOUNTED CIRCUIT BOARD, CN-1019
305	A-8263-243-A	o	MOUNTED CIRCUIT BOARD, DA-76A
306	A-8263-164-A	o	MOUNTED CIRCUIT BOARD, DAP-1
307	A-8263-162-A	o	MOUNTED CIRCUIT BOARD, DBD-1
308	A-8263-161-A	o	MOUNTED CIRCUIT BOARD, DDE-1 [for NTSC]
	A-8263-268-A	o	MOUNTED CIRCUIT BOARD, DDE-1(P) [for PAL]
309	A-8263-163-A	o	MOUNTED CIRCUIT BOARD, DEN-1
310	A-8263-160-A	o	MOUNTED CIRCUIT BOARD, DRC-3 [for NTSC]
	A-8263-266-A	o	MOUNTED CIRCUIT BOARD, DRC-3(P) [for PAL]
311	A-8263-153-A	o	MOUNTED CIRCUIT BOARD, EQ-48(1)
312	A-8263-171-A	o	MOUNTED CIRCUIT BOARD, EQ-48(2)
313	A-8263-245-A	o	MOUNTED CIRCUIT BOARD, IF-443
314	A-8263-242-A	o	MOUNTED CIRCUIT BOARD, PE-29
315	A-8263-241-A	o	MOUNTED CIRCUIT BOARD, SH-47
316	A-8263-158-A	o	MOUNTED CIRCUIT BOARD, SV-148
317	A-8263-159-A	o	MOUNTED CIRCUIT BOARD, SY-191 [for NTSC]
	A-8263-265-A	o	MOUNTED CIRCUIT BOARD, SY-191(P) [for PAL]
318	A-8263-235-A	o	MOUNTED CIRCUIT BOARD, VA-144

Plug-in Board (for DVW-700WS/700WSP)



No.	Part No.	SP	Description
401	A-8263-244-A	o	MOUNTED CIRCUIT BOARD, AD-97
402	A-8263-236-A	o	MOUNTED CIRCUIT BOARD, AT-84
403	A-8314-655-A	o	MOUNTED CIRCUIT BOARD, CN-1103
404	A-8314-656-A	o	MOUNTED CIRCUIT BOARD, CN-1104
405	A-8314-657-A	o	MOUNTED CIRCUIT BOARD, CN-1105
406	A-8263-243-A	o	MOUNTED CIRCUIT BOARD, DA-76A
407	A-8263-164-A	o	MOUNTED CIRCUIT BOARD, DAP-1
408	A-8263-162-A	o	MOUNTED CIRCUIT BOARD, DBD-1
409	A-8263-161-A	o	MOUNTED CIRCUIT BOARD, DDE-1 [for NTSC]
	A-8263-268-A	o	MOUNTED CIRCUIT BOARD, DDE-1(P) [for PAL]
410	A-8263-163-A	o	MOUNTED CIRCUIT BOARD, DEN-1
411	A-8314-643-A	o	MOUNTED CIRCUIT BOARD, DP-213 [for NTSC]
	A-8314-668-A	o	MOUNTED CIRCUIT BOARD, DP-213P [for PAL]
412	A-8263-160-A	o	MOUNTED CIRCUIT BOARD, DRC-3 [for NTSC]
	A-8263-266-A	o	MOUNTED CIRCUIT BOARD, DRC-3(P) [for PAL]
413	A-8263-153-A	o	MOUNTED CIRCUIT BOARD, EQ-48(1)
414	A-8263-171-A	o	MOUNTED CIRCUIT BOARD, EQ-48(2)
415	A-8263-245-A	o	MOUNTED CIRCUIT BOARD, IF-443
416	A-8263-242-A	o	MOUNTED CIRCUIT BOARD, PE-29
417	A-8263-241-A	o	MOUNTED CIRCUIT BOARD, SH-47
418	A-8263-158-A	o	MOUNTED CIRCUIT BOARD, SV-148
419	A-8263-159-A	o	MOUNTED CIRCUIT BOARD, SY-191 [for NTSC]
	A-8263-265-A	o	MOUNTED CIRCUIT BOARD, SY-191(P) [for PAL]
420	A-8263-235-A	o	MOUNTED CIRCUIT BOARD, VA-144

MOUNTED/PRINTED CIRCUIT BOARD LISTS

Part No.	SP	Description
A-8263-176-A	o	MOUNTED CIRCUIT BOARD, AIF-5
A-8271-615-A	o	MOUNTED CIRCUIT BOARD, CN-775
A-8263-165-A	o	MOUNTED CIRCUIT BOARD, CN-884 [UC,EK]
A-8263-284-A	o	MOUNTED CIRCUIT BOARD, CN-884(J) [J]
A-8263-177-A	o	MOUNTED CIRCUIT BOARD, CO-20
A-8263-156-A	o	MOUNTED CIRCUIT BOARD, CTL-10
A-8263-157-A	o	MOUNTED CIRCUIT BOARD, CUE-2
A-8275-257-A	o	MOUNTED CIRCUIT BOARD, DR-195
A-8263-168-A	o	MOUNTED CIRCUIT BOARD, HN-189
A-8263-154-A	o	MOUNTED CIRCUIT BOARD, MA-62
A-8263-179-A	o	MOUNTED CIRCUIT BOARD, MB-500
A-8263-155-A	o	MOUNTED CIRCUIT BOARD, PS-333
A-8263-169-A	o	MOUNTED CIRCUIT BOARD, RE-97
A-8263-170-A	o	MOUNTED CIRCUIT BOARD, RE-98
A-8263-166-A	o	MOUNTED CIRCUIT BOARD, SE-210
A-8263-167-A	o	MOUNTED CIRCUIT BOARD, TC-75 [J,UC]
A-8263-270-A	o	MOUNTED CIRCUIT BOARD, TC-75(P) [EK]
A-8275-248-A	o	MOUNTED CIRCUIT BOARD, VF-56
A-8263-233-A	o	MOUNTED CIRCUIT BOARD, VR-177A
1-649-431-12	o	PRINTED CIRCUIT BOARD, CN-951
1-652-876-11	o	PRINTED CIRCUIT BOARD, CN-956
1-652-771-11	o	PRINTED CIRCUIT BOARD, CP-254
1-652-768-13	o	PRINTED CIRCUIT BOARD, HP-60
1-652-769-11	o	PRINTED CIRCUIT BOARD, KY-293
1-652-902-11	o	PRINTED CIRCUIT BOARD, LP-74
1-649-426-12	o	PRINTED CIRCUIT BOARD, LP-75
1-649-427-12	o	PRINTED CIRCUIT BOARD, LP-76
1-649-428-12	o	PRINTED CIRCUIT BOARD, LP-77
1-652-905-12	o	PRINTED CIRCUIT BOARD, PSW-29
1-652-877-11	o	PRINTED CIRCUIT BOARD, SW-636
1-652-875-11	o	PRINTED CIRCUIT BOARD, SW-639
1-649-430-12	o	PRINTED CIRCUIT BOARD, SW-652
1-652-770-13	o	PRINTED CIRCUIT BOARD, VR-175

NOTE
[J] :For Japan
[UC]:For U.S.A and Canada
[EK]:For Europe

APPENDIX A

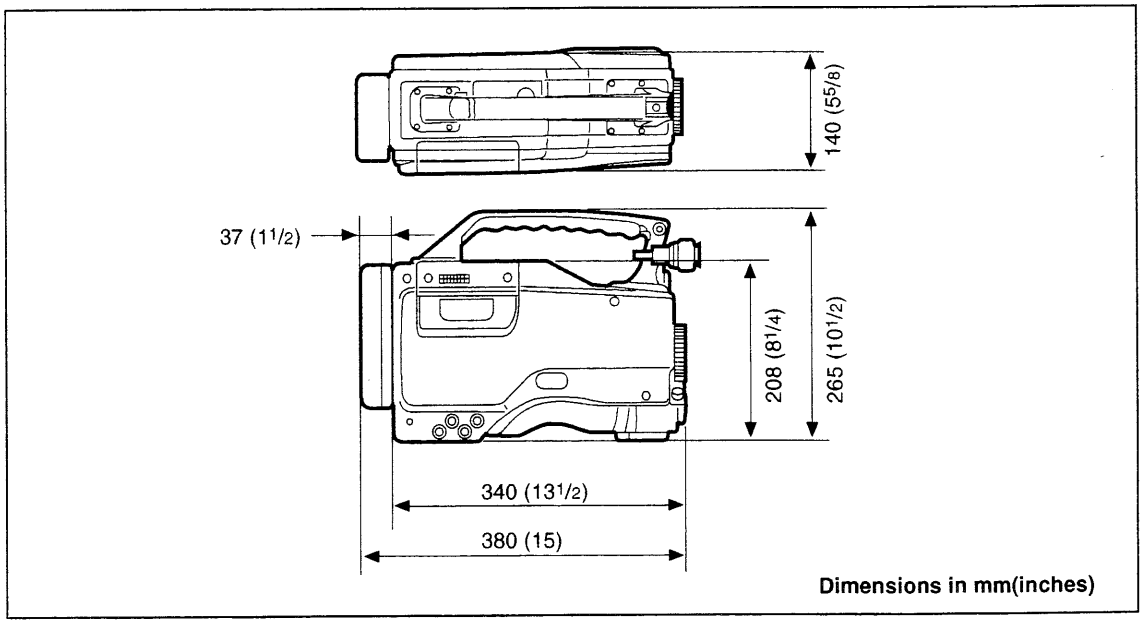
SPECIFICATIONS

NOTE

Design and specifications are subject to change without notice.

Power voltage : 12 $^{+5.0}_{-1.0}$ V DC
Power consumption : 28 W (12 V DC supply, when recording)
Operating temperature : 0 °C to 40 °C (32 °F to 104 °F)
Operating humidity : 25 % to 85 % (relative humidity)
Storage temperature : –20 °C to +60 °C (–4 °F to +140 °F)
Mass : Approx. 7 kg (15 lb 7 oz) (with lens, cassette and BP-L60 Battery Pack)

Dimensions



Dimensions in mm(inches)

Video Camera Section

General

Imager : DVW-700/700P ; 2/3-inch frame interline-transfer type
DVW-700WS/700WSP ; 2/3-inch wide aspect (16:9) frame interline-transfer type
Hyper HAD CCD
Imager Configuration : RGB, 3 CCDs
Spectral system : F 1.4 prism system (with quartz filter)
Built-in filters : CC filter A ; Cross filter B ; 3200 K C ; 4300 K D ; 6300 K
ND filter 1 ; Straight through 2 ; 1/4 ND 3 ; 1/16 ND 4 ; 1/64 ND
Electronic shutter speed : DVW-700/700WS
- 1/100, 1/125, 1/250, 1/500, 1/1000, 1/2000 second
- 260 speeds from 60.1 to 7000 Hz (CLS mode)
- 248 speeds from 30.4 to 58.3 Hz (ECS mode)
- 1/60 second (super EVS mode)

DVW-700P/700WSP
- 1/60, 1/125, 1/250, 1/500, 1/1000, 1/2000 second
- 310 speeds from 50.2 to 9000 Hz (CLS mode)
- 295 speeds from 25.4 to 48.7 Hz (ECS mode)
- 1/50 second (super EVS mode)

Lens mount	: Special bayonet type	
Sensitivity	: 89.9 % reflection chart, 2000 lx (F8 standard)	
Minimum illumination	: 1.9 lx (at F 1.4, +30 dB gain)	
S/N	: DVW-700/700WS	; 62 dB (Y typical)
	DVW-700P/700WSP	; 60 dB (Y typical)
Horizontal resolution	: DVW-700/700P	; 850 TV lines (at center)
	DVW-700WS/700WSP	; 680 TV lines (16:9 mode) (at center)
		600 TV lines (4:3 mode) (at center)
Degree of modulation	: DVW-700/700P	; 70 % (TYP) at 5 MHz (at center)
	DVW-700WS/700WSP	; 70 % (TYP) at 5 MHz (16:9 mode) (at center)
		55 % (TYP) at 5 MHz (4:3 mode) (at center)
Registration	: 0.05 % or better for entire screen area (excluding lens distortion)	
Geometric distortion	: None identified (excluding distortion due to lens)	
Smear	: –120 dB (Y typical)	

Viewfinder

CRT	: 1 1/2-inch monochrome, quick start type
Horizontal resolution	: 450 TV lines (16:9 mode) (at center)
	600 TV lines (4:3 mode) (at center)

VTR Section

General

Usable cassettes	: 1/2 -inch Digital BETACAM cassettes
	BCT-D6 /D12 /D22 /D32 /D40
Tape speed	: Approx. 96.7 mm/s
Record / playback time	: 40 minutes (using BCT-D40)
Fast forward time	: Approx. 6 minutes (using BCT-D40)
Rewind time	: Approx. 5 minutes (using BCT-D40)
Continuous recording time	: Approx. 120 minutes (using BP-L60)

Video (with standard playback machine)

Bandwidth	: Luminance	; 0 to 5.75 MHz $^{+0.5}_{-0.7}$ dB
	Chrominance (R-Y, B-Y)	; 0 to 2.75 MHz $^{+0.5}_{-0.7}$ dB
S/N	: Luminance ; 62 dB min.	
Differential gain	: 2 % max.	
Differential phase	: 1° max.	
K-factor (2T pulse)	: 1 % max.	
Y/C delay	: 15 ns max.	

Audio (with standard playback machine)

Frequency response	: 20 Hz to 20 kHz $^{+0.5}_{-1.0}$ dB
Dynamic range	: 85 dB min.
Distortion (at 1 kHz)	: 0.08 % max.
Crosstalk (at 1 kHz)	: 70 dB max.
Wow and flutter	: Detected value max.

X-RAY RADIATION WARNING

Be sure that parts replacement in the high voltage block and adjustments made to the high voltage circuits are carried out precisely in accordance with the procedures given in this manual.

CAUTION

Danger of explosion if battery is incorrectly replaced.

Replace only with the same or equivalent type recommended by the manufacturer.
Dispose of used batteries according to the manufacturer's instructions.

Vorsicht!

Explosionsgefahr bei unsachgemäßem Austausch der Batterie.

Ersatz nur durch denselben oder einen vom Hersteller empfohlenen ähnlichen Typ.
Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

ATTENTION

Il y a danger d'explosion s'il y a remplacement incorrect de la batterie.

Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le constructeur.
Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

ADVARSEL!

Lithiumbatteri-Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri af samme fabrikat og type.
Levér det brugte batteri tilbage til leverandøren.

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DVW-700 (UC)
DVW-700WS (UC)
DVW-700P (EK)
DVW-700WSP (EK,英)
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